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ADEQUATE FOREST FIRE PROTECTION by federal, state, and other agencies, individually and in cooperation; the REFORESTATION OF DENUDED LANDS, chiefly valuable for timber production or the protection of stream-flow; more extensive PLANTING OF TREES by individuals, companies, municipalities, states, and the federal government; the ELIMINATION OF WASTE in the manufacture and consumption of lumber and forest products; the advancement of SOUND REMEDIAL FOREST LEGISLATION.

The ESTABLISHMENT OF NATIONAL AND STATE FORESTS where local and national interests show them to be desirable; the CONSERVATIVE MANAGEMENT OF PUBLIC AND PRIVATE FORESTS so that they may best serve the permanent needs of our citizens; the development of COMMUNITY FORESTS.

FOREST RECREATION as a growing need in the social development of the nation; the PROTECTION OF FISH AND GAME and other forms of wild life, under sound game laws; the ESTABLISHMENT OF FEDERAL AND STATE GAME PRESERVES and public shooting grounds; STATE AND NATIONAL PARKS and monuments where needed, to protect and perpetuate forest areas and objects of outstanding value; the conservation of America's WILD FLORA and FAUNA.

The EDUCATION OF THE PUBLIC, especially school children, in respect to our forests and our forest needs; a more aggressive policy of RESEARCH AND EDUCATIONAL EXTENSION in the science of forest production, management, and utilization, by the nation, individual states, and agricultural colleges; reforms in present methods of FOREST TAXATION, to the end that timber may be fairly taxed and the growing of timber crops increased.

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Member A. B. C.

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HOUR OF AUTUMN

I love the hours when wild geese fly
As apples hang in autumn haze,
My heart's in tune, I know not why
I love the hours when wild geese fly;
Spring's winsome ways I can't deny,
But more to me are trees ablaze;
I love the hours when wild geese fly
As apples hang in autumn haze.

—Myrtle Alice McCarey

AMERICAN FORESTS

Vol. 36 NOVEMBER, 1930 No. 11

What the Drought Has Done to Trees

By Ovid Butler

ARE the drought-stricken trees which spot the landscape in many regions of the country really dead? This is a question a dry and parched American public has been asking, while President Hoover's National Drought Committee is seeking ways and means to relieve drought sufferers in the most seriously affected areas. The question has been asked of fruit, forest, and ornamental trees, all of which have suffered varying degrees of damage. Another question which seems to puzzle the American public is that some trees have apparently died or turned a sickly brown, while their immediate neighbors remain green. This is especially true of street trees in many cities. One tree retains its vigor while another tree a few feet distant seems seriously affected. After asking this and many other questions as to the extent of tree damage throughout the nation and what tree species have suffered most, the public sums up by asking what, if anything, can be done to give first aid to nature's thirst-wounded trees.

Blighted trees dotting the landscape of states singed by one of the worst droughts in weather history have stirred the interest and sympathy of the American public. "What has the drought done to trees?" is being widely asked.

Are the drought-stricken trees which spot the landscape really dead? Why have some trees apparently died or turned a sickly brown while their immediate neighbors remain green? What tree species have suffered the most? What can be done to aid the stricken trees? What is the extent of tree-damage throughout the drought areas? These and other questions are answered in this article as far as possible at the present time.

It is impossible to answer definitely most of these questions. In the first place, the foresters throughout the nation have had little opportunity to study and investigate to any degree of thoroughness the effect of the drought on individual trees, or even tree species. To them the drought brought about a greater and more serious menace—that of acute, abnormal forest fires. Furthermore, so many conditions exist among the affected trees that it is too early to draw other than general conclusions, based, for the most part, on fundamental knowledge of tree life. That millions of trees have been killed by one of the most devastating droughts in weather record history cannot be denied. Millions more have been stricken, but only the unfolding of time will reveal to what extent.

As a matter of fact, it will never be possible to set down in exact figures the 1930 drought damage to trees. If it were possible, they would be grouped as trees killed outright by lack of water; trees weakened by drought and later killed by insects, disease, or other external forces; reduced crops of fruit and seeds both in quantity and quality; arrested tree growth and vitality; and abnormal forest-fire conditions.

While blighted trees dotting fields, woodlots, hillsides, and city streets throughout the drought area have aroused the interest and concern of the public, foresters express the belief that the number of trees actually dead this fall is much smaller than appearances would lead one to believe. None of the foresters in the drought states place the loss of large trees today in excess of one per cent. The mortality of small trees, however, has been much heavier, particularly on dry sites and among baby trees growing wild and in plantations. Every spring billions of little seedlings unnoticeable to the layman poke their heads through the humus of field and forest and struggle for a foothold on life. With these little wildlings—the trees of the future—the drought has played havoc.

Speaking of the situation in southern Pennsylvania, Chester A. Coover, of the Pennsylvania Forest Research Institute, says that the recovery of most forest trees may be expected.

"Older and less thrifty individuals will begin to die at the top and become stagheaded," he said. "Smaller trees are more likely to be killed outright, and conifers whose leaves and buds have dried up cannot recover."

F. W. Besley, State Forester of Maryland, one of the states hardest hit by the dry weather, does not believe that a great many large trees are actually dead at this time.

"It appears that where the leaves have withered and fallen and winter buds have formed," he stated, "the trees will come out all right next spring. But in cases where the leaves have dried up and remain on the tree, it indicates either that the tree has died or at least the terminal shoots have died back."

Fruit trees in the drought areas have been exceptionally hard hit, and, strange as it may seem, the old reliable Ben Davis apple tree has suffered the most, according to Dr. John R. Magness, of the Bureau of Plant Industry, United States Department of Agriculture.

"The drought took a larger toll of Ben Davis trees than any other variety," Dr. Magness declared. "This was probably due to the fact that these trees were carrying an unusually heavy load of fruit which in turn levied an abnormal drain upon the reserve food supply of the trees. Thus they were left in a weakened state to carry on other functional activities under the adverse conditions created by the drought."

Dr. Magness' reference to the Ben Davis apple tree bore directly upon the question of why some trees have been affected by the drought more than others. But what answers that question in the case of the Ben Davis apple does not necessarily answer it in the case of other tree species or even individuals of the same species. For example, there are the dogwoods that grow in wild profusion in our eastern forests and are preyed upon so scandalously every spring by flower gatherers. Hundreds and thousands of dogwoods, particularly in Maryland, Pennsylvania, and Virginia, appear to have been badly whipped at the hands of the drought, not because they were maturing a heavy feast of berries for the birds but because nature has not fashioned their roots for such droughts as 1930. Theirs is a shallow root system that keeps close to the surface of the soil. The soil, be it remembered, is the water reservoir of all trees, and successive days of blazing sun with no rain intervening, wreak vengeance first and longest on the water supply of shallow-rooted trees. The dogwood grows naturally under cover of larger trees, and its roots in their moisture-gathering work must compete with the voracious roots of these sturdier trees. In times of drought the competition for moisture becomes terrific and the tree with the larger, deeper root system has no mercy for its competitors. No wonder the little dogwood has had a bad summer.

There is no single answer to the question why some trees have suffered more from the drought than others, unless it is lack of water. This answer is too inanely obvious to mean anything without an explanation of what water means to a tree and of some of the factors which determine a tree's reaction to moisture shortage. Trees can no more live without water than can animals. Indeed, trees and humans are not unlike. Both are living organisms made up of protoplasm and living cells. Both must have food. There is this difference, however. The food of animals is made for them, while trees must make their own food with which to build their bodies and to generate energy required in their vital functioning. The soil minerals essential to tree growth are brought into the tree in water solution through the roots, and water is vital to the process by which the leaves assimilate carbon and oxygen from the air. The amount of water that a tree uses and throws off by evaporation during a summer's day is really astounding. A good size fruit tree, for example, may use from fifty to one hundred gallons, while a large forest tree may eliminate two or three times that amount every twenty-four hours.

The leaves of a tree are its food making factories but, like many other factories, they must have water to function properly. This water, carrying soil materials in solution and being lifted by a method not clearly understood, is brought to them through the water channels of the tree. Each leaf is made up of millions of cells, and every cell is an industrious, coordinated worker during the food-making season—spring and summer. With energy drawn from the light of the sun, with carbon dioxide from the air and with water from the soil they convert the substances brought to them in solution into sugar, starches, oil, and protein. From these leaf factories the foods are sent throughout the tree to supply materials and energy for growth. The healthy tree always manufactures an excess of food which it stores up for future use so that when its food factories cease work in the fall the outer cells of the tree are packed with surplus food. A small portion of this reserve is used during the winter, but the bulk of it is carried through to spring to start and sustain growth and to produce fruit and seed crops.

It is thus apparent that to deprive a tree of water is to take from it an element vital to its food making and growth processes. To understand more clearly the way the water supply is regulated and guarded one should consider the numerous minute slits or mouths in the outer surfaces of a leaf. These tiny mouths called stomata are invisible to the naked eye and are most numerous on the lower leaf surface. Each little mouth is flanked by two guard cells which regulate their opening and closing. The chief function of the stomata is to "breathe in" air carrying carbon dioxide and to control the elimination of water from the tree. Thus when conditions are favorable for food making the stomata are open, but when adverse conditions develop they close automatically. This helps protect against the loss of moisture during excessively dry periods. The stomata will close even before the leaves show any visible wiltings. But even this and other safeguards with which nature has provided the trees cease to protect when a prolonged drought reduces the water supply below that which the tree must have to meet its requirements for food and growth. The tree becomes weakened and declines just as a starving person, and if it does not die a slow death from starvation it may later in a weakened condition be the easy victim of disease, insects, or winter killing.

So many factors and circumstances enter into the source of a tree's moisture supply and the effect upon it of a water shortage that as already stated there can be no common answer to why some trees have fallen sick or died and some have not. A broad explanation applies in such cases as the Ben Davis apple trees and the dogwoods. To the trees drought has been much like disease epidemics among people. The weak and less drought-resistant species and individuals have suffered most as a general rule. This is a rule punctuated, however, with many exceptions because in- (*Continuing on page* 724)

Regal Galagina, as shown in this reconstruction of a habitat group in the American Museum of Natural History.

Galagina, the Gobbler

By Alexander Sprunt, Jr.

IN SOME lights his back and breast glowed like lambent flame. In others his plumage seemed wonderfully somber, like the dim-lit aisles of his forest home. In whatever light that struck him he was regal, commanding and superb. Amid the natural world, as in the human sphere, it is not wise to draw comparisons but measured by avian standards, Galagina, the forest gobbler, was a king.

He made a royal picture on that morning when I saw him last. It was on a high ridge thickly grown in splendid hardwoods, which towered over the lesser growth—growth which was hung with scented jessamine and the ethereal blooms of Cherokee rose. The ridge fell away to a cypress swamp where wine-brown water lost itself in dimly mysterious vistas of gray-green trunks and hoary "knees." Galagina stood there in a golden splash of sunlight, his small head held high, his drooping beard swaying in the breeze, his plumage glinting and flashing with varying fires of bronze. He typified the very spirit of the low-country woods and, looking at him there, it seemed but a step back to the days when the red hunters of these very forests passed like

phantoms on their hunting parties, or glided silently in their dugouts over the flooded bottoms. These same red hunters had seen other turkeys in the colored woods and had given them their own name of Galagina, the Gobbling Ones.

As he is king in the lowlands so is he the ruler of the hills. As he glows and struts under the pines, live oaks and cypresses, so does he parade his beauty before his consort beneath the towering hemlocks and the aromatic balsams. Sometimes I think that he is even more regal among the dark wild evergreens of the peaks. I have seen him in both the lowlands and the mountains and it is hard to decide which setting is suited better by his presence. After all, it does not matter, Galagina of the mountains is king just as Galagina of the low country is monarch. How long will he continue so?

There was a time when nearly anyone who wandered far afield could see America's greatest game bird. The woods of New England, the edges of the plains, the peaks of the Adirondacks and the Appalachians, and the coasts of the Atlantic Ocean and the Gulf of Mexico all echoed to their gobbling. But these resounding notes are no more. The New England woods are destitute of hens and gobblers, they are gone from much of the mountain and the plain country and are scattered in diminished bands throughout the Southeastern States. In more than one locality where they are found now their days are numbered.

There is now before the lawmaking bodies of this country a bill which asks for the complete protection of our national emblem, the bald eagle. It may not be generally known that the wild turkey was once advocated for this position, and by no less a personage than Benjamin Franklin, who gave many and excellent reasons for his choice. The turkey won favor with many, but the adherents of the eagle were victorious and so we have it today on our coins and seal. While we are remembering the eagle, should we forget the turkey?

Intimately connected with the history of America, the turkey should mean much to every citizen of the United States. It meant a great deal to the Pilgrim Fathers; it was chosen to grace the Thanksgiving boards of both the early settlers and more recent celebrators; it emblazoned its way into the very heart of a national institution and has become synonymous with the service of Thanksgiving. It saved many a hunter and his family in years gone by; it furnished sustenance in part for those who made this country. It has woven itself into the very warp and woof of American history; yet today is little more than an echo, a shadow, whose flickering life may vanish soon into that oblivion from which there is no returning.

The one time abundance of this great bird seems almost incredible to us of today. Many of the early travelers and naturalists have left accounts of the vast flocks which roamed the woodlands and which are now, like the buffalo of the plains, but a pitiful remnant. For fascinating descriptions of the feathered inhabitants of America one hundred years ago, one must ever turn to John James Audubon. The great woodsman must have had a particularly friendly feeling for the turkey, for he writes at length about it. From him we learn something of its numbers and read that so common an article of food was the bird that they sold for less than a common barnyard fowl. Individuals of ten and twelve pounds were priced at three pence each and "a first-rate turkey, weighing from twenty-five to thirty pounds avoirdupois, was considered well sold when it brought a quarter of a dollar."

The bare fact that wild turkeys have survived in the numbers prevalent today, in spite of human persecution, ruination of its natural habitat by deforestation and attacks by natural enemies, speaks highly for their intelligence and ability to take care of themselves. Necessarily, such a bird has many enemies, as its native woods are open to assault by various beasts and birds. Wildcats, 'coons and foxes seek it, while skunks, minks and others prey upon the eggs. The great horned owl and the golden eagle take them, while the crow, and formerly the raven, vied with the animals which robbed the nests. That the turkey has held its own against its natural enemies is evident. The gobbler is no mean fighter, and the quick wit and eternal vigilance displayed at all times goes far toward foiling the raids of furred and feathered pirates. It remained for man to be the downfall of the turkey, the white man, for the Indian never brought it to its present state.

In avoiding the attacks of avian enemies the turkey sometimes shows remarkable resource. Audubon leaves us an account of how the great horned owl is cheated of its prey in a most novel manner, which well illustrates the intelligence of the bronzed dwellers of the woodlands. Roosting in flocks, they not infrequently attract the attention of the big owls, which, though inferior in size and weight, do not hesitate in acting as a veritable bolt of doom amid the darkness. Seeing a band of roosting turkeys, the horned marauder hovers on silent wings, maneuvering for a suitable position. It rarely fails to escape the vigilance of some member of the flock, however, and a warning cluck causes all the birds to raise their heads and stare about them. They do not fly, but stand erect on the branches, watching keenly. With its victim singled out, the owl darts forward on a long dive. The turkey whirls around, lowers its head and crouches forward bringing its fully spread tail up over its back in an inclined plane. Thus the owl is met by a smooth expanse of big feathers over which it literally skids. The turkey immediately drops to the ground and makes off safely under the trees. Surely an example of cool-headed judgment which is extraordinary among the wild kindred.

Even today, on well-protected game preserves, the turkey has enemies enough to deal with beyond the hunter and his gun. Attempts are made to exterminate "vermin" but, too often, mistaken zeal is applied, for many hawks and owls are killed which would otherwise capture the wood rats and other rodents which feast upon (*Continuing on page* 737)

The Next Step in Forest Taxation

By William Mauthe

THE erroneous opinion still holds in some quarters that forest-crop tax laws are primarily an easement of tax burdens for the timber owners. As a matter of fact the forest-crop tax laws are the direct outcome of the economic conditions in the cutover regions. They are not fads, nor did they come about as a result of the deliberate efforts of the private timberland owners to evade taxes. The forest-crop tax laws are the result of relentless pressure of economic conditions.

Actually, the demand came from counties facing bankruptcy. No taxes whatever were being paid upon millions of acres of cutover lands, which were reverting to the counties, a dead weight upon county governments.

Anyone traveling in northwest Minnesota, or in northeast Michigan and Wisconsin, can, within a day, view hundreds of thousands of acres of tax-delinquent lands unfit for agriculture and suitable only for forest purposes.

Wisconsin has about 4,500,000 acres of tax-delinquent lands which, unless reclaimed by the original owners, eventually will become the property of the counties. There are 6,000,000 acres of tax-delinquent lands in Minnesota. Unless the owners can keep on paying taxes on these lands, they will eventually drift back to the State.

Michigan has about 9,000,000 acres of such lands. The first forest-crop tax law of the State was supposed to turn tax-delinquent lands into state forests automatically and at once. But the Michigan law remains a dead letter. The State was supposed to pay five cents an acre into local treasuries, but the money has not been forthcoming.

Under the circumstances all the Lake States find it necessary to induce timberland owners to retain their land and devote it to timber production instead of abandoning it for nonpayment of taxes. Hence the forest-crop tax law. As long as the state or the counties cannot take over these tax delinquent lands and make them productive, what means remain by which this land can be made to produce taxable wealth? Even the most optimistic agriculturists and land-colonizers no longer believe that this cutover land can be absorbed into agriculture. The present economic trend in agriculture all over the country is toward concentration on the better lands and the abandonment of marginal lands. The only apparent use to which this cutover land can be devoted is timber-growing and recreation.

A northern hardwood forest after selective cutting. A similar cutting can be made in twenty years, bringing an earlier severance tax to the State than from bare lands which have been replanted.

There may be an element of injustice in giving the timber owners an easement in taxation in order to induce them to hold the land which they themselves made largely unproductive by overcutting and burning. But what can be done about it?

Some local communities must either lose the entire tax income from a large portion of the cutover land, or be content with a smaller annual tax until the land is restored to productivity. One leads to bankruptcy, the other to slow recovery. For these reasons the recent forest-crop tax laws enacted in all three Lake States are a direct benefit to the people, especially to the local

A nursery of the Nekoosa-Edwards Paper Company, at Port Edwards, where 2,000,000 seedlings are produced annually for planting on the 32,348 acres which this company has entered under the forest-crop law.

communities in which such lands are located. There is a certain sympathy due the settlers and the residents in the cutover regions. At a time when local government costs are increasing, the communities find their timber taxation slipping away. But there seems to be no way out of it under present township and county government organization.

There are certain differences in the forest-crop tax laws in the three Lake States. These differences must be considered in planning the next steps in forest taxation.

The Minnesota law, enacted in 1927, provided for a tax of eight cents on the dollar of assessed valuation—one-third of true value. This was changed later to a flat five cents an acre. There is also an annual tax of three cents an acre for fire protection and a yield tax of ten percent when the timber is cut. In Minnesota the State pays nothing to the counties for the listed lands. There have been no listings of consequence under the Minnesota law.

Under the later Michigan law, owners of land classified under the forest-crop statute are subjected to a tax levy of five cents an acre on pine lands and ten cents an acre on hardwoods. A yield tax of twenty-five percent of the stumpage value of mature timber is levied when the timber is cut. The yield tax is divided between the State and the county. The State is supposed to pay an additional five cents an acre to the counties; but lack of definite appropriations have been a hindrance to the proper working out of this provision.

It is not surprising that registrations have not been numerous under the Michigan law. Under date of December 1, 1927, it was reported that 103,977 acres had been offered for registration, with 32,934 acres accepted, 29,237 acres definitely rejected, and 41,806 acres awaiting further action.

Wisconsin's first forest-crop tax law became operative in 1927. What has been done indicates that Wisconsin has been more successful than other states. It must be kept in mind, however, that other states did pioneer work and that Wisconsin was able to profit by their experience and mistakes. When Wisconsin's legislators went about the task of framing a law, they went into conference with both trained foresters and practical lumber operators. These two factors had much to do with the state's advance in drafting a workable, understandable law.

The first requirement of a workable forest-crop tax law is that it shall be understandable, its purpose must be understood by the landowners and the general public. Only by taking the public into its confidence can the State hope for success. The taxpayers cannot be blamed if they feel at times that an effort is being made to shift tax burdens from the forest owners to the shoulders of farmers and city residents. As states, counties, cities and towns cooperate with the owners of forest lands, the public, watching this work, will grow more and more forestry-conscious, making possible longer and longer steps in the direction of forestry realization.

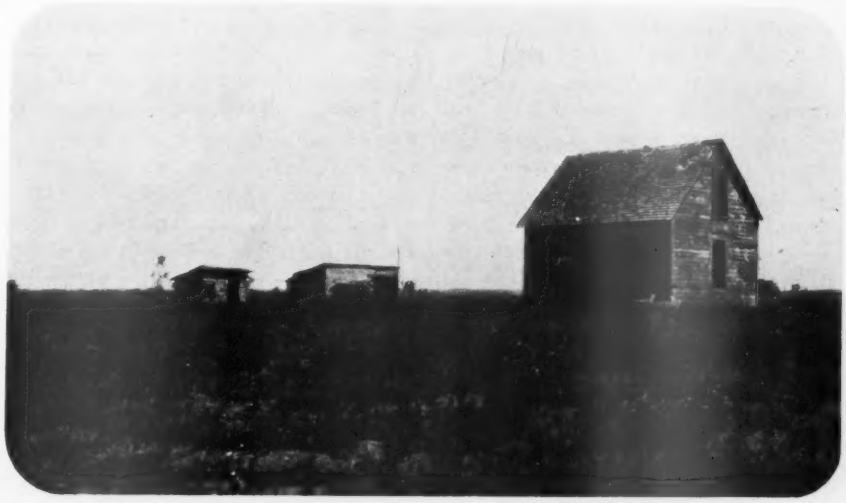
Under the Wisconsin law the owner's tax is a flat ten cents an acre; to this the State adds another ten cents, actually an advance against an expected severance tax. This severance tax is ten percent of the stumpage value at the time of

A five-year plantation of jack pine, showing possibility of an early yield of pulpwood in the restoration of tax-delinquent lands.

cutting. Counties have the same rights as individuals in entering lands, and the State will advance the ten cents an acre on county-owned lands as well as on privately owned property. Payment of the State's share is guaranteed by continuing appropriations which have given a sense of security to both the counties and the owners of the lands.

This first step in Wisconsin has been successful beyond that of any other State. Approximately 300,000 acres of land are now under the Wisconsin law with another 50,000 acres in the process of registration. The legislature of 1929 amended the law to permit the registration of land with merchantable timber stands. Through operation of this amendment the Conservation Commission may enter into a mutual agreement with the landowner which will guarantee the subsequent harvesting of the mature crop in a manner not detrimental to the remaining stand.

In order that there may be no misunderstanding as to what selective cutting means, it is proposed that the owner shall include in his application a definite statement as to just how the timber is to be harvested and marketed. This statement, if satisfactory, will be part of the agreement upon approval of the application. If the statement is not satisfactory, amendments may be suggested to the owner, and the application accepted only if and when the amendments are made. It seems reasonable to assume that timberlands registered under such a law as now exists, and under such terms as described, will produce not just one timber crop, but a succession of satisfactory crops at reasonably frequent intervals. Thus it would seem that an important step, so far as Wisconsin is concerned, lies in the reasonable and businesslike administration of the amended law.



An abandoned sand farm which was purchased by the Tomahawk Kraft Paper Company at Tomahawk, Wisconsin, and planted to jack pine—typical of the privately owned land in the Lake States which may be brought back to production under proper forest-crop tax laws.

Wisconsin has been intentionally liberal in accepting lands for registration. It is not possible to make substantial progress if, while encouraging people to do something worthwhile, obstacles are thrown in their way. There must be more than a little liberality in administering forest-crop tax laws if they are to succeed. One of the legislative members of Wisconsin's Interim Forestry Committee is quoted as saying:

"What of it if the State never does get back the ten cents an acre which it is contributing to lands registered under the law? If we can bring back the forests of the State and maintain its wood-using industries, the indirect benefits to the State will more than repay for this small contribution."

Of course the situation could never come to such a pass. The State is too well protected under the law. There is little or no danger that the state will lose anything.

The law provides that the lands may be examined every five years—for the purpose of determining whether the owner is acting in good faith. Each five-year period is a period of probation. If it is found that no timber is being produced, or likely to be produced, the land goes back onto the regular tax rolls. The difference between the two kinds of taxes can be collected retroactively, and the State will have lost nothing.

Some owners may register without strong conviction and actual intention to devote the lands to forest culture. But during the probation period they may see what is being done by others, may become convinced of the benefits to be gained, and decide to comply with the spirit and letter of the law before it is too late. The mounting tax lien against the lands will be a spur and incentive to such a change of heart.

The Commission does not feel that merely to set aside the lands meets the intent of the law, or fulfills the objectives of the Wisconsin people. These objectives will be fulfilled only when the Commission and the owners of forest lands so cooperate that the lands are brought into the highest possible forest productivity.

Wisconsin has been encouraging private owners to list their lands and has even encouraged the counties to put their lands into state forests to enjoy the benefits of the law. The forest-tax law here has two aims: First, to assist the cutover counties and townships by stopping land abandonment; and, second, to save the remaining forests from going the way the original forests have already gone.

Wisconsin's citizens consider the reclamation of cutover lands as the problem of the whole state rather than as the task of the towns and counties in the regions most directly affected. There is ample evidence of this in the results of the referendum of 1924, when the people voted almost two

to one for amendment of the constitution to allow a tax levy for forestry purposes.

The legislature of 1929, acting under the authority of the constitutional amendment, levied a general property tax of one-twentieth of a mill. Wise administration of the funds so raised and demonstrations of accomplishments will lead to increases as fast as the proper machinery for administration can be developed and put into operation. There are lands to purchase, planting to be done and much work ahead in fire prevention and suppression.

But as in the case of privately owned lands, the mere setting aside of areas does not necessarily create a forest; in all cases it is advisable, in many cases necessary, to plant, underplant, or take other measures to insure forest growth.

Certainly Wisconsin is taking the proper course in advancing to the local governments an amount equal to the taxes paid by the landowner. It should increase the registrations to 1,000,000 acres within a few years, but even 1,000,000 acres will not be enough. There should be 3,000,000 or even 4,000,000 acres of Wisconsin's cutover land producing forest crops. All that is needed is the will to do and a workable forest-crop tax program.

The federal income-tax laws require that expenditures for planting and improving forest lands must be accounted for as capital investment. These charges are not deductible as annual expense against annual income. Under the federal rulings the forest-crop expenditures must wait for deductions until the timber is cut. The interest cost in advancing money for forest crop production has no standing with the federal income-tax authorities. Forest-crop producers are not even permitted to count interest charges as an operating expense.

Although forest-crop production is entitled to be encouraged instead of discouraged, this is a matter of plain justice. Wisconsin tax laws cut this entire tangle of complication by simply allowing expenditures for planting, protecting and improving forest crop as operating expenses. Why should forest-crop production be discriminated against under the federal income-tax laws?

It is time to remove this tax prejudice and permit forestry expense to be accounted for as operating expense. Until the federal government ceases to penalize forest-crop production, we can scarcely expect timberland owners to practice forestry. If, as it is claimed that forestry should be an integral part of the business of primary wood-using industries, then as a next step in forest taxation, the federal tax law should be amended to permit such industries to deduct their annual forest-operating expense from the income of that year.

Forest projects are just as worthy as highway projects which receive federal and state aid. The proposal to aid forestry in like manner seems directly in line with state aid to schools, agricultural associations, county fairs, and similar projects. Certainly the state and nation will benefit in the end by the prosperity which will come to the counties producing forest products and the industries using them.

Federal and state aid could well be given to counties located within a fire-protection area provided the counties are actually engaged in forest-crop production. The amounts to be contributed by state or federal governments would depend upon the size of the forestry project and to what extent and in what manner the county participates.

Counties which own or will own large areas of tax-delinquent lands and register these lands under the Wisconsin forest-crop law will receive ten cents an acre from the State annually. Perhaps counties could be encouraged, to reserve for forest purposes, this ten cents an acre. To such sums, and to any other moneys which the counties can afford to allot to forest development, I believe the state and the federal government should add an equal amount as an out-and-out gift. New York seems to be making splendid progress under a similar law.

One of the most important next steps in forest taxation should be to provide for general registration of forest land. All land of a certain description should come automatically under the operation of a forest-crop tax law. This already is a feature of the Oregon law passed in 1929.

Stated as bluntly, this sounds like a radical, revolutionary proposal. But it must be considered in the light of what may develop from proper administration of the present optional law. Wisconsin has an automatic workmen's compensation act. In the beginning the law was optional; employers elected to come under its provisions or not, as they thought best. The optional law worked well from the outset. More and more employers came under the law until it applied to a large percentage of the industries; practically all employers under the law were freely endorsing it. Then the law was made automatic without a ripple of complaint, and it has continued to operate with general satisfaction.

Much the same thing may happen in the case of the forest-crop tax law. If the law works as well as first indications lead us to believe; if the law is administered as it should be administered, then there is no reason why it should not come to be almost universally effective by general acceptance.

Perhaps there might be an intermediate step, a period during which the state authorities would be charged with the duty of examining lands, and where conditions are ideal, given the right to initiate proceedings, requiring the owner, if he objects, to show cause why the land should not be classified as forest land. Such an automatic forest-crop tax law, applied to forest-crop lands only, should not seriously disturb the current tax revenue the counties will receive.

The ten cents an acre received from the state of Wisconsin annually, and a like sum from the landowner, together with the equity value of a growing forest within the county, may be more substantial and more dependable than the doubtful tax income from lands becoming tax delinquent and reverting back, a dead load to the counties.

We now are ready for a universal, automatic forest-crop tax law which will provide for general registration of lands of certain classified descriptions located within fire-protection areas. This is a third suggestion for a next step in forest taxation.

These steps are natural, simple, practical, and when they have been taken there will have been made marked progress toward restoration of the forest resources of the nation.

Button! ⁘ Button! the Squirrel's Got the Button!

By D. S. Olson

A LARGE camp of men had assembled to gather pine cones. The crop was exceptionally good, and of even more importance, squirrels were especially numerous and active in hoarding away the cones with the palatable seed for their winter's food. It soon became a battle of wits between the cone pickers and squirrels. The men quickly learned that robbing squirrel caches was more lucrative than climbing trees for the cones. The squirrels, on the other hand, were not long in meeting this new situation that confronted them.

Transportation facilities were inadequate so that stacks of sacked cones accumulated along the trails and roads, awaiting the pack trains and trucks that were to transport them to the extracting mill. It was then that the squirrels had their inning. They gnawed their way into the sacks and retrieved their cones. One French-Canadian aptly expressed the situation in this way: "Gimme my time—I queet. Me swipe one sack cones from zee squirrel and zee leetle devil, heem swipe back two sacks."

Nor did the squirrels stop there. Later they appeared, a chattering army, at the seed extractory where thousands of bushels were spread out on drying racks—to reclaim their stolen cones. Some instinct warned that the cones would not stay in the racks all winter, so they became busily engaged in re-caching their stolen food in lumber piles; in convenient receptacles about the plant; and in the machinery. Some carried the cones back to the woods retracing exactly the same course a hundred times a day, retrieving a cone on each trip. Apparently the last cone had been picked from the trees. There was too much at stake for both men and squirrels in the cones already down. The work had resolved itself to "Button, button, who's got the button?"

Although pitched into an unprofitable game in which they have nothing to gain and everything to lose, the squirrels are not doomed to destruction by the unscrupulous hands of the cone pickers, popular belief to the contrary.

The scarcity of squirrels one year is often attributed to starvation; and fear is expressed at the time that they are becoming extinct. Then follows another year when the woods are again teeming with squirrel life. The little animals are subject to diseases epidemic at intervals like the malady that holds the balance between rabbits and other animal life. They also have their natural enemies in the mink, weasel and other creatures of the forest which are more abundant some years than others. The food supply for the squirrels does not appear to be a factor at all.

Whether engrossed in caching his winter supply of cones, or rushing about reclaiming his stolen property, Pine-squirrel is the busiest little fellow in the woods.

It is common knowledge among woodsmen that when there are few squirrels in one vicinity the same is generally true over a large region. At such times they are just as scarce in the inaccessible forests where few men have set foot as in the comparatively small areas where cone pickers have "cleaned them out." Furthermore, cone crops do not occur every year but do come quite regularly at three-year intervals. The cones hoarded away in the fall of a good crop are used the following winter. None of these remain to tide the squirrels over the following two years, until the next cone

crop. But they have other food. Fungus growths of various kinds are abundant in the woods. These too are hoarded away for the winter. Oftentimes a cone picker's exploring hand runs amuck in a gelatinous mass of toad stools put away in the hollow of a stump. The "squirrel's Christmas tree," as it is sometimes called, is a common sight in the woods. This is his cache of fungi placed in trees. Little heaps of various colored growths are placed on the horizontal foliage and some are punctured on the short, dead twigs along the trunk of the tree.

Little Mr. Pine Squirrel munches reflectively as he pauses to rest.

Then, too, where lodgepole pines grow, there is always seed on the trees for the squirrels because the cones of this species remain on the trees for years and some of the seed is retained in the cones for three or more years. These trees commonly associate with the more desirable seed trees of the western white pine region sought by the cone collectors. There is another source of food for the squirrels in the millions of good seeds in the deep duff of the forest floor that nature, in her prolific seeding, has been storing for years. Thus it appears that nature has provided for the squirrels in various ways.

Of greater interest is the ability of the squirrel to stand off his adversary, the cone picker. He is cunning in hiding his caches. He is an efficient worker and can, in a short time, replenish his supply when robbed. There is every reason to to believe that squirrels hoard away large quantities of cones that they alone can reach, for caches have been found entirely submerged in water; high up in the crotches of trees, or hidden in cavities with openings large enough for a man's empty hand to penetrate but too small for egress with a cone. Thus the squirrels match their wits with man's limited power. Even on the ground where there is nothing physical to hinder the cone picker, the squirrels cunningly conceal their cones and it is often only by accident that the caches are found. On the average collection job but one bushel of cones is found to every acre of forest reconnoitered—less than two per cent of the crop.

These are seed collecting bins at the extractor plant, with white pine cones spread on the drying trays.

Three things point to the vicinity of a squirrel's activities but these in no way show the location of the cache. During cutting, the cones lying under the trees are, of course, betraying evidence. Later when they have been assembled the cone picker looks first for the absence of cones on the trees; because bare tree tops indicate that the squirrels got there first. Then he assures himself by looking under the trees for the little clusters of fresh pine needles cut down with the cones but removed by the squirrel before storing away for the winter—just as the farmer removes the carrot tops before putting the vegetables in the root cellar. There is often a telltale heap of scales from a cone hastily eaten by the squirrel to refresh itself for renewed efforts in the business of gathering more cones. But none of these signs point to the cache. The cone picker learns, however, that frequently it is hidden in a damp place; consequently he explores along the stream courses and boggy ground. The squirrels have a very good reason for putting the cones in moist places. Moisture keeps them tightly closed.

It avails one nothing to watch the squirrels for a give-away to the cache. They see you first every time. The writer was once very anxious to procure some Douglas fir cones. They were at the time quite generally infested with a boring insect and none could be found on trees without this injury. Then occurred the happy thought that squirrels would not gather bug-ridden cones, so it was necessary only to find a cache. But a cache was not to be found. However, a squirrel was finally caught in the act of cutting fir cones. The writer carefully sneaked near and hid behind a tree. Perhaps the squirrel would soon start adding this new supply to his cache and, sure enough, along he came—right past the ambushed enemy—with a perfect cone, over to an old stump and then back for another. He made seven trips.

With visions of a cache with perhaps three or four sacks, the pilferer came boldly from under cover, no longer caring if the squirrel saw him. Imagine his chagrin upon finding seven cones—and realization that the whole act had been staged!

The fact that squirrels rarely mix the cones further simplifies the work of the cone pickers. True, a cache spread over a quarter-acre of ground may contain several species, yet they are invariably kept separate. One pocket will contain all white pine cones, another white fir, and so on. Occasionally a pile of one species will be garnished with one cone of another placed temptingly on top. Large seeded species are more commonly found in caches than cones with small seeds. The reason appears obvious, for species such as white bark pine yield as high as seven pounds of seed to the bushel, whereas cedar and hemlock yield only a pound of seed to the bushel. Yet these small seeded cones are often cached as well as the large ones.

The speed with which the squirrels work is something at which to marvel. As an old-timer once put it in describing the activities of the squirrels: "It's unsafe to go in the woods without a helmet; why, the cones are just raining down." Actual timing of one squirrel revealed that the cones were being clipped one a second. Apparently one snap of the sharp teeth severed the cones, but the movements were too rapid to be distinct. In watching the cutting operations of a squirrel high up in a spruce tree, it was noticed that the tree leaned in such a position that the crown was directly over a mountain stream. The cones fell into the water and were carried away with the current. Mr. Squirrel was called six kinds of a little fool and left to his futile task. But behold! A short distance down stream lay a solid mat of spruce cones caught in an eddy along the bank. The efficient squirrel had taken advantage of the situation and utilized the current to assemble the cones. Had he tossed them to the banks on either side much additional work would have been necessary to find and assemble the cones in the underbrush. In hand-picking cones—once they are clubbed down from the trees—the most discouraging part is assembling them. It often happens that a man labors for half an hour to reach the cone-bearing branches, tears his clothes and becomes miserably gummed up with pitch, only to find when he descends but six or seven of the fifty cones he has dropped.

Sometimes harvesting is delayed until after the cones begin to open and then the seeds are easily dislodged from beneath the scales. The squirrels display ingenuity by selecting trees that stand over a dense growth of brush on which the cones fall, breaking the force of the fall and thus cushioning the jar that otherwise would spatter all the seeds from the cones to the ground. There is, of course, some consolation in the scientific viewpoint of cone robbery. A cone picker ransacks a cache. On his way down the trail with his stolen goods he meets the owner. An argument ensues. The squirrel scolds with constant chattering, emphasizing the while with frisks of his tail. But what further is to be said when the cone picker closes the argument with: "Shut up. Next year I'll bring back lots of little trees grown from the seeds in these cones which will develop in time to more cone-bearing trees for you and your baby squirrels."

Seed dealers are reluctant to dissolve partnership with the squirrels for a far more important reason than the economy of gathering the cones under the present arrangement. It is impossible for the cone pickers to determine the quality of the seed without dissecting the cone. The seeds may be hollow, partly or entirely lacking in the cones, or improperly developed. The squirrels in some uncanny way know beforehand all about this. They gather only the best cones to be had of the species.

There is a parallel case in the history of the honey industry. Honey was first obtained from wild bee trees; that is, the bees were robbed of the food they had hoarded up for winter use. Man could not obtain honey from the flowers nor make synthetic honey, but he has found that he can profitably feed the bees with sugar and sorghum through the winter in exchange for the honey. A similar arrangement may be worked out between the squirrels and seed collectors. It may be possible, for instance, to exchange peanuts for pine cones. Based on the present market price of white pine seed at $3.50 a pound and peanuts at fifteen cents, this arrangement sounds sensible—if it works. At any rate, one seed collector is trying this out. Last fall, an entire cache was ransacked of cones and peanuts placed in their stead. The first step in the experiment will be to determine if the squirrels will eat the peanuts. There may, of course, be complications in the application of this scheme. For instance, if the cone pickers are supplied with peanuts, some hard-boiled fellow may rob the cone caches and eat the peanuts, too. Who knows, it may some day be a common sight to see peanut stands in the woods and a steady stream of squirrels answering the call of the peanut whistle with a contribution of pine cones for a nice fresh-roasted, double-jointed peanut!

TREES

Marvin Luter Hill

The love of trees is in my blood: the tall
Slim poplar, and the sweetgum tree by cool
And singing streams; the chestnut tree, the small
Dogwood, with ivory petals beautiful;
The fir tree, with its memories of Yule.
The larch, the honey-blossomed lime, and all
Thick groves of oak, where chiseled acorns fall,
And lonely trees beside some desert pool.

Trees are my comrades: under them I keep
Vigil with clouds, and many a winking star
In the deep azure, where dream-castles are;
They bring me quiet thoughts and peaceful sleep:
They walk with me down many a winding lane,
And talk, with leafy murmurings, of rain.

The road in Arnett Canyon winds through this American Desert Garden.

Cactus and Other Things

A Glimpse of the Boyce Thompson Southwestern Arboretum in Arizona

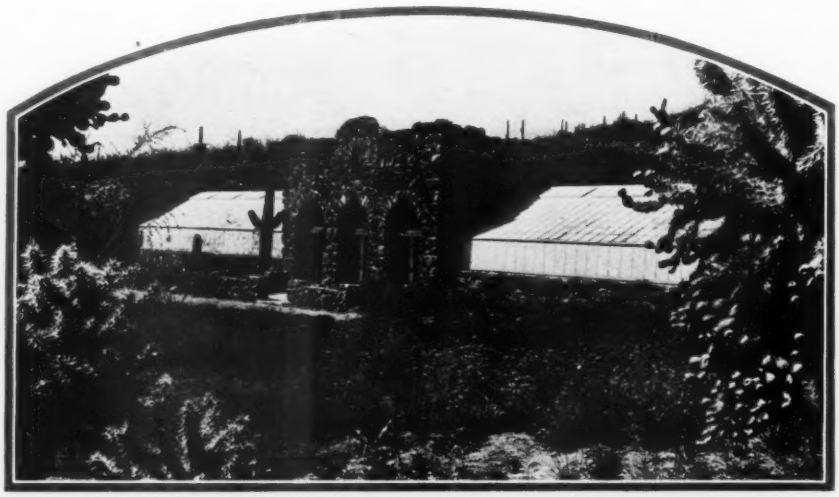
By Edward P. Ancona

"AND above all things," said Director Crider, "don't carry away the impression that this is a cactus garden."

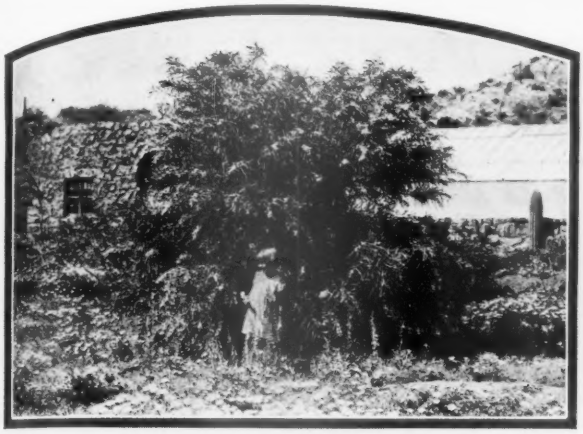
I didn't; but it is natural for the uninitiated to seize upon these weird shaped and spinily picturesque plants as the most important, and to many the only plants worthy of note, that grow in the American desert. Especially true when one finds a place where in a limited area more than three hundred species grow naturally or have been transplanted from the far corners of the Americas.

At the Boyce Thompson Southwestern Arboretum, near Superior, Arizona, the cacti after all are in the minority. Their showy presence will not be denied, especially when in bloom, but here where in less than five years over 5,000 species of the world's desert flora have been collected, there is much of interest naturally besides the cactus.

Not alone are the plants—grasses, shrubs, vines, cacti, trees—of interest in themselves. Their origin is imagination stirring. The labels neatly printed and attached to this great host of exotics sound like a roll call of the countries of the world — countries, that is, with climatic conditions similar to our great Southwest. Here a row of stately eucalyptus, each a different species, proclaims Australia; there a weird, twisted, caricature of a plant, a cactus from the Chilean Andes; climbing with luxuriant

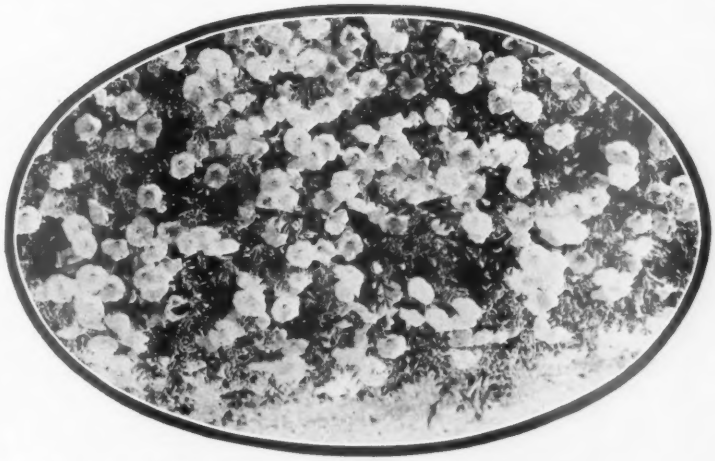


Built of native rock and fitting smoothly into their natural background, the administration buildings are beautifully set.



Near the administration buildings wild flowers cover the ground between native and introduced tree species. Exotics from Arabia and Persia, Australia and the Chilean Andes vie with one another in their new home.

abandon over a rocky canyon wall bearing a host of lovely flowers that have come half way around the world from central Asia; a clump of forage grasses grows in a bed, its ancestors for centuries having fed the nomad herds of Arabia; hanging over this lovely canyon trails a tree of rare fruit, its parent seed from a tree in a far-away Persian garden. And many more.



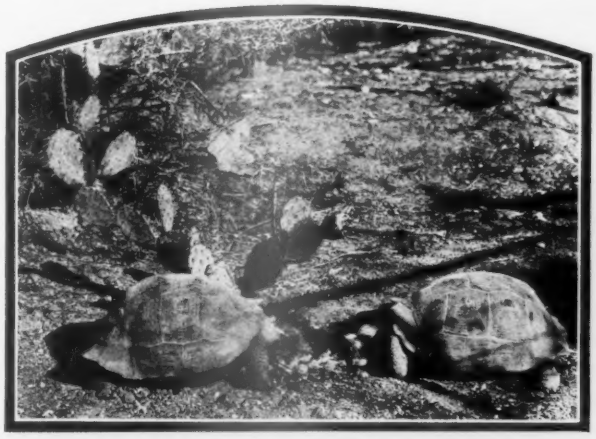
Prodigal in its blooming, convolvulus from far-away Morrocco spreads its vivid beauty on the desert floor.

Founded five years ago, the Boyce Thompson Arboretum can be said to be just getting under way. Such a project established by a far-seeing man visioning many years into the future counts its brief past as barely the genesis of its life. But the project seems full blown even to one first seeing it, though on second thought it is obvious that here is just the sketchy outline of an undertaking holding promise of developments of immense importance to the great empire of our Southwest.

"It is not generally known," said Dr. F. J. Crider, the Aboretum Director, pointing to a world rainfall map in his office, "that one-half the earth's surface has twenty inches or less of rainfall, corresponding approximately to our conditions here." Allowing this to sink in, one begins to see a horizon stretching away from this spot that reaches to the world's end. And that is not exaggerating for, as far as known, this project has no counterpart in the world and yet its studies of plant life will in a measure be applicable to half the surface of the globe.

The Southwestern Arboretum is the second of the two great plant study projects endowed by the late Colonel W. B. Thompson, mining man and former head of the Magma Copper Company, whose mine is the chief support of Superior, the little Arizona city nearby. Wealth obtained through years of strenuous life and work beneath the earth's surface has been expended with generous hand by Col. Thompson to increase our knowledge and wealth of plant life growing on the surface. It is said that this rather unusual combination of mining man and patron of plant research was due to early days in the copper smelting communities of the West when practically all vegetation was killed by the smelter fumes. It is understood that a determination made then to have about him and see more plant life when the chance came was the birth of the idea of the founding of the Boyce Thompson Institute of Plant Research at Yonkers, New York, and later this Southwestern Arboretum. Whatever the cause that directed Colonel Thompson's interest in this direction, coupled with the very substantial endowments made to the two institutions, humanity will ultimately be infinitely the richer with the passage of time.

The physical layout of the Arboretum with about 2,000



Prickly pear fruits loom large in the diet of the giant tortoises from Galapagos. Extinction threatened them in their natural habitat off the west coast of South America, and nineteen have been brought here in an effort to save them from the depredations of man and animals.

acres of southwestern typography, embraces a sufficient variety of soils and exposures to give a typical cross section of many thousands of square miles of territory. The area is extremely rugged, including a rock walled, moist bottomed canyon; a great boulder-tossed region of many acres extent; numerous small flats with deep soils; another long, comparatively dry canyon winding along the base of Picket Post Mountain which rises abruptly inside the Arboretum area to an elevation of 4,400 feet. The extremes of elevation in the area vary from this height down to 2,300 feet.

Set in an area of natural scenic beauty are the administration buildings, laboratories, green houses and propagating sheds built of native stone, all fitting unobtrusively into the natural background of rock and native and introduced flora. There is a large reservoir filled by a pumping plant in the canyon bottom supplying irrigation for such trees and plants needing more water than nature supplies. It need be said in passing that much of the introduced plant life exists under natural conditions without artificial moisture.

The propagation of the newly received plant varieties is principally from seed. From correspondents in all parts of the world, from government agencies, missionaries, private individuals and expeditions the Arboretum receives from three to five hundred new species a year. The seed are filed systematically, and from each lot a portion is planted in the green houses and propagating rooms. From here the plants go to the natural areas of the Arboretum with complete records maintained of each lot all along the line.

"We do not plan to limit our experiments to this immediate vicinity," said Dr. Crider. "Already we have sent out tree species and plants to cooperators living in this region at various elevations and expect to check regularly on these plantings. Further, we are negotiating for an area of typical deep soil in a desert valley which we will fence, and transplant there a number of our most promising forage grasses and shrubs. We will not disturb the existing flora."

The research work here takes in many phases of plant study. An extremely interesting root study was observed near the main laboratory, in large glass boxes along a deep trench. Nearby a self-recording instrument is shown registering the growth of these giant cacti.

During the tour of the Arboretum the trail led past a fenced enclosure with a heavy stand of brush and cactus, principally prickly pear, up in the rocky area above the administration buildings. Here were observed a number of large land tortoises received about a year ago from the New York Zoological Society. The tortoises are from the Galapagos Islands off the west coast of South America.

Due to depredations of man and animals, the Galapagos turtles are threatened with extinction in their natural habitat. Attaining the large size of six to eight hundred pounds, they are highly valued for food. Nineteen of these interesting creatures, youthful ones weighing only about fifty pounds each, were sent here for trial. They feed on the native flora, cactus principally, and flourish well, in spite of the fact that pneumonia has taken its toll of several that failed to stay at night in their electrically heated dugouts last winter.

Dr. Crider produced something that looked like large wrinkled coffee beans.

"These are from a local native shrub," he explained. "It's a nut not hitherto utilized but which we have found a way to make edible with a little treatment. No; I won't tell you more about it yet, since we want to do a little more work on it. Also we had around here—but it's been sampled out of existence—some jars of delicious jelly we made last fall from local cactus fruit."

At the dedication of the Arboretum on April 6, 1929, nearly 1,500 visitors came from twenty-six states. What the aims and purposes of the institution are can best be quoted from Dr. Crider's statement when he addressed the assembled visitors.

"The Arboretum," he said, "represents a great creative idea of the late Colonel William Boyce Thompson, and is intended to serve the semi-arid inland portion of the southwestern United States, which includes about 500,000 square miles, with a rainfall below twenty inches. The Arboretum hopes to assist in solving the problems which will make it possible to use more efficiently those vast semi-arid lands. The functions of the institution include the study, improvement and preservation of native and introduced plants, with a view to their greater utilization and wider economic adaptation. In the expression of its founder, 'the Arboretum is an institution wherein to grow every tree, shrub, vine, grass and flower able to withstand in the open ground the climate of the Southwest; a little portion of the vast area, erroneously known as the Great American Desert, preserved forever in the richness of its native flora, where will be assembled, nurtured and studied all that is useful, interesting and beautiful in plant life from all the arid and semi-arid regions of the world; a place where the yet hidden secrets of these varied forms may be further revealed for the enrichment of human knowledge and the benefit of mankind.'"

TO A LEAF

When I go
May I go like you
In a ripple of golden mirth
With a gallant dash
And a crimson sash
To the bosom of Mother Earth!

—Bessie Rainer Ford

Sport in Sardinia

By Peter Upton Muir

TRAVEL, especially in little-known parts of the world, is one of my hobbies. Hunting is another, and when possible I combine the two. Last year I was down in Montenegro, where I suffered untold physical inconveniences, but bagged a generous supply of game. I lazed away the spring and summer in the neighborhood of Trieste, partly on the island of Brioni, partly at Porto Rosa, now and then at Abazzia—all excellent spots for swimming and general loafing. As fall came along I began to wonder where I should go to get my shooting. Montenegro didn't tempt, for I couldn't face the body vermin which are all too plentiful there. A friend, who is a colonel in the Fascist militia, suggested Sardinia. I frankly laughed in his face. How could the second largest island in the Mediterranean, situated only a few hours from Rome, still abound in game. However, he insisted that there was plenty, both large and small. Also an abundance of trout, and as he himself was a Sarde, I decided to take him at his word, and have a look at the island anyway, for it was the only one in the Mediterranean I had not visited.

Trout were plentiful in Sardinia—so much so that the natives, who knew nothing of the joy of the sport, never bothered to fish for them.

A train to Rome and the Rome-Cagliari plane made the trip from Trieste a short one. The worst that could happen would be to take some trout, and if my friend's story of the game was untrue I could run up to Scotland for grouse.

At Cagliari I made inquiries regarding fish and game laws. For shooting I should have to wait a bit, but trout seemed to have no legal protection whatsoever. Nobody bothered to fish for trout in Sardinia. The inhabitants just didn't see any sense in it, for couldn't you buy all you wanted at fifteen cents a pound? While the Sarde is a great hunter he cannot understand the fun of fishing.

On the first of September I set out for the Barbagia, a mountainous region in the heart of the island, where banditry still exists and where the peasantry have stubbornly stuck to their brilliant, if savage, national costumes. It is a picturesque country, quite unspoiled by the forward march of modern civilization. I still had two weeks to wait before the opening of the partridge season, but I could fish. A splendid stream was easily located and before I had been whipping it an hour my creel was nearly filled with trout, small ones, running between seven and ten inches, but game.

After three days of this sport I had enough of the little fellows and decided to make my way to the lower country near the charming village of Dorgali. Someone had told me they ran larger down there and they had spoken the truth. Never have I seen as many trout swimming, playing and feeding in one stream. It was literally alive with them, and a rare thing was to catch one under half a pound. Often they tipped the scales at a pound and a half. My best catch weighed almost three pounds. The stream was rather sluggish, but the fish fought magnificently. An old-timer who fished for his living informed me they wouldn't rise to a fly at this time of the year. I have never used anything else, and my only trouble was, especially during the sunset hour, that I couldn't reel them in fast enough.

Partridge season was to open in a day or two. I had seen so many of the birds that I decided to stay on for awhile at least. I had met with warm and sincere hospitality from the country folk. They urged me not to leave, promising plenty of sport, and the promise was kept even beyond my imagination.

On the opening day three of us bagged one hundred and fifty birds. The youngest member of the party spent most of his time carrying them back to the car for they were too heavy to take along. Had we left them strung up foxes would have stolen them. I do not mention the rabbits we shot, for rabbits are only a sideline in Sardinia, as are ducks, quail and many other varieties of smaller birds.

I was not sorry when October 31st ended the partridge season, for it seemed to me that too many of these feathered creatures were being bagged. However, the season is short and they breed large coveys. I was assured they could hold

their own against the hunter as long as the present excellent game laws are enforced, and they are sure to be while the Fascists hold power. If I had no other reason to admire Mussolini and his followers, and I have many, I should be forced to admit them in the right for their wonderful protection of game.

I had come to the island intending to spend a month, possibly six weeks, and, to paraphrase, "I who came to scoff remained to slay." Two months had passed since my arrival and, as far as I could see, there wasn't much chance of my getting away for another two months, for boar hunting opened the day after partridge season closed. I also had obtained special permission from the Minister of the Interior in Rome for several head of deer and muflon. There is no open season for these splendid specimens of the island's wild life, but permission may be had without great difficulty.

Janko—my guide, friend and philosopher on the hunt in Sardinia—with a prize muflon.

Fall was in the air when Janko, my guide, friend and philosopher, and I arrived at his hut high in the hills to the south of Dorgali. What a view! Miles and miles of rugged seacoast. The Mediterranean, mantled in its bluest blue, rolling about and blinking lazily at a cloudless sky. Here and there white dots — fisher boats — broke the monotony of the sea. An eagle sailed overhead, pointing his course westward where the flocks of sheep were gathering for the winter. I was rudely brought back from my reveries by the terrible hand of Janko clutching my arm. He hissed a warning in my ear not to move. I followed his gaze and there on a nearby summit a muflon stood, looking out to sea as if admiring the glorious panorama as I had done. Several smaller specimens quickly came up behind him, but he was a wise old fellow, scented danger and galloped off over the far side of the hill, without so much as glancing in our direction. Janko's grip loosened on my arm and he spoke. "Tomorrow morning, Signor, you will get your allotment of muflon. They are plentiful. Then for the deer and after the deer we shall go high in the mountains where the wild boar are as numerous as the sheep in the Campidano. You will see what Sardinia has to offer her friends." I was proud to be known as one of the island's friends.

Photograph by Carlo Pellerano

Partridges, and plenty of them, are to be taken in Sardinia. On the opening day of the season, three of us bagged one hundred and fifty birds.

Next morning we were out and had taken up our station in an advantageous spot, where we could see but not be seen, long before the sun rose out of the sea. There was a light breeze from the west, which was favorable as we were on a bluff to seaward and any warning scent would be carried out over the water. We had been settled but a short while when I saw Janko become rigidly tense. Looking around to my left I espied the muflon not forty yards away. Slowly and carefully I aimed. My guide made a peculiar guttural noise. The leader hesitated a moment, looking in our direction. I fired. The rest of the herd galloped away.

As Janko had said, I filled my quota of deer and muflon in two days. He was the best guide I ever had, knowing every movement the animals would make. Due to his excellent guiding and my fair shooting we brought down three muflon and three deer with only seven cracks of my rifle. Slowly we worked our way down to Dorgali, each carrying a muflon. We could send back for the rest of the game which had been carefully cleaned and safely hung in the cabin.

A bus took us to Nuoro and a rented car to Aritzo where we were to make our base for wild-boar hunting. Here I was to receive one of the prettiest lessons in mountain etiquette that I have ever seen. I was also to have an extremely narrow escape from a wounded boar.

The night of our arrival

we were sitting around the open fire in the kitchen of the inn, watching a fat little peasant girl, in bright scarlet costume, roasting two young goats, drinking and chatting with newly made friends, young officers from the continent also there for the shooting. That morning the hunters from Belvi had invited them to a beat and they had brought in fifteen boar. They were very enthusiastic and warm in their praises of the sport in Sardinia. The door opened and the *"capocaccia,"* head huntsman, of the village entered. Each village has a *"capocaccia"* whose word is law regarding the hunting. He was a fine grey-bearded old fellow, picturesque in his costume, dignified in his carriage. After bowing slowly to each of us he took his seat, poured himself a large glass of red wine, drained it, poured another, lit his pipe and spoke. "Tomorrow, my friends, there will be no hunt. The dogs must rest. For the following day I have invited ten huntsmen from Belvi. We shall work up the north hollow. Many boars are there."

After a good day in the lowlands we had a fine kill of rabbits and partridge. Though the annual kill is heavy, game in Sardinia is well protected by law.

"But," protested a young officer, "that will make too large a crowd. We are six here. Tomorrow seven of my friends arrive. You with your ten hunters make twenty-four in the party. We cannot have the men from Belvi."

There was a moment of embarrassed silence. The girl at the fire turned one of the browning kids nervously. The old man smoked and drank, then answered. "The unwritten law of the mountain says that when hunters have been guests of one village they return the courtesy on the first possible occasion. The rule has never been and never will be broken."

"That would make thirty-five. It is quite impossible," continued the young officer, "we cannot have it."

The old man rose without finishing his glass, walked stiffly to the door, turned, bowed politely, and remarked, "Then there shall be no hunt." He closed the door and was gone.

The *"capocaccia"* had said "There shall be no hunt." The young officer had said there should. I held my peace and decided on watchful waiting. Janko appeared to be worried.

The two kids were now a beautiful golden brown. Our little servant stuck them a few times with her long fork, seemed satisfied with her work, and placed them on the table. No one had lost his appetite over the discussion. It took but a few moments to reduce the savory dish to a pile of well-cleaned bones. A hunter may be a good, bad or indifferent shot, but he is always a first-class eater. We drank, talked and sang well into the night. Before we turned in the officers had formed their plans to hunt without the

A group of Sardinian "hill-billys" with trophies of the chase.

"capocaccia." I was politely skeptical. Janko was openly scornful.

"We cannot hunt with them," he informed me as we went off to our room, "but we can go and watch the fun. They will make no kill, for I know the old one well and his word goes."

Next day the other officers arrived. They all busied themselves with preparations for the hunt. The young officer returned about noon from a neighboring village where he had arranged for dogs and hunters. He radiated confidence. "Of course, the hunt will take place," he announced.

The afternoon was spent oiling guns, drinking and talking. Janko visited the *"capocaccia,"* informing him that we would be at the hunt but without arms. Rightly enough he wished to keep on the good side of the local hunters.

Well before sun-up we had been placed in strategic positions on both sides of the valley by the strike-breaking *"capocaccia,"* hired by the young officer. Janko and I kept together. Shouts of the beaters came up to us from far below, echoed against a mountain crag and rolled off into emptiness. On they came, nearer and nearer. Their shouts became more frantic as they urged the dogs to greater efforts. A yelp, another and another. The pack was on a fresh scent. They were not more than a quarter of a mile away now. The baying of the dogs, mingled with the strange shouts and calls of the beaters, would have made a shiver run up the spine of the most jaded hunter. They were almost on us. We could hear a noise in the bushes as a boar trotted past. Janko was nervous. He feared his old friend from Aritzo was not going to live up to his word. "There shall be no hunt," he had said, and here was the game at our very feet. Suddenly the guide's face was wreathed in smiles. He pointed to the head of the valley. I saw a dozen reckless horsemen coming towards us. At their head I recognized the venerable *"capocaccia"* from Aritzo, riding like a Cossack. In a moment they were in between the hunters, mingling with the hounds and boar, shouting, "Do not shoot, we are here, you will kill us." No one dared disobey, though the game was to be seen scurrying past on all sides, for a shot would have been almost certain to kill or wound one of the riders, so ubiquitous did they appear to be.

The last officer and hunter had dragged himself wearily back to the inn, discouraged and beaten, before the old fox and his followers halted their activities. Janko punched me, laughed loudly and exclaimed, "the law of the mountains!" I frankly believe the head huntsman from Aritzo would have gladly died rather than have it said that a hunt had been given from his village without returning the courtesy of the hunters of Belvi. Such was his code. That afternoon the officers left for Orgosolo, many miles away.

Janko and I were in high favor. The same night the *"capocaccia"* came to drink with us, and many a chuckle we had over the events of the day. He was in excellent spirits and told us many a yarn of the mountains. Laughingly he explained that his dogs were well rested, that the boar were still in the north valley, and if we wished a beat could be arranged for the morning. We were delighted and certainly made no objections to inviting the Belvi hunters. After dispatching a boy with the invitation he retired.

Twelve boar were brought down the following morning. As the guest I was stationed at the most advantageous post, so was responsible for two of the twelve, having, however, cleanly missed one shot. This was indeed sport, and had I been Prince Humbert himself the mountaineers could not have treated me with greater kindness. Rough men they were, but sound in mind and body. To them a guest was a guest, whether he be prince or pauper, and they performed their duty as hosts with a simple sincerity rarely found in our more civilized world.

Towards the end of our first week in the mountains we were invited to Desulo for a hunt. As the shouts of beaters and the baying of hounds came up from the valley below I felt that I had never passed a more glorious time than in Sardinia. The thrill of life; the pleasure of living was in my every bone. Standing there half-dreaming, philosophizing to myself, I did not realize the dogs were almost in our midst. A rustle on my right brought me to myself. I turned and saw, emerging from the underbrush, a boar, the largest I had ever seen and by far the largest that had been bagged since my arrival. The hair down his back stood on end—his tusks gleamed. He saw me, stopped, and as I raised my gun, he turned to retreat, for a boar will rarely give fight when unhurt. I fired, wounding him in the left flank. He turned again, this time towards me. Furious, head lowered, he charged. I aimed for a second shot, but as I fired my right foot slipped. The bullet went wild. I had fallen flat on the wet ground. By some miracle I dodged the savage beast on his first attack. He overran me a few yards and turned for a second attempt. My gun was useless. Following the custom of the country I had adopted a double barreled shotgun loaded with buckshot. I drew my knife, knowing it would be of little help against this wounded boar with his five hundred pounds of weight and brawn. As he lowered his head and snorted for his second charge I raised my knife, ready to strike. A shot rang out from somewhere above. The boar, practically on top of me, hesitated, shivered violently and fell dead—not two feet from my knife-clasping hand.

Janko, some fifty yards away, had heard me shoot, had climbed on a large rock to watch the kill, had realized the seriousness of my situation as I lay there and at the risk of hitting me, had fired. He knew this was my only chance, for the wounded boar, in his blind fury, would have gored me to death before help could arrive. So to Janko I owe my life. Personally I shall hunt boar in the future with an automatic rifle.

Looking down on bold relief heavily eroded along Salmon River in Idaho. The broad, dark band is the river, the narrow, light one a road, while the several winding lighter marks are horse and cattle trails.

Sky Maps for the Forester

By HOWARD R. FLINT

With Vertical Aerial Photographs by the Author

TO BOYHOOD, living in the age of romance, maps are the keys to hidden treasure, pirate gold, high adventure. Lives may be bartered freely for a coveted chart. Lives still may be bartered for maps, but there is, alas, less of romance in the trading. To the explorer, maps are inspiration, fascination—their farther edges leading off into *terra incognita*. To the soldier, maps are knowledge, the key to victory; to civilization, maps are an indispensable guide, a necessity to progress, and a record of it.

Photograph by J. C. Whitham

The aerial photographers make final preparations for a trip aloft.

Historians record that maps have been found which were drafted more than 2,500 years ago. Probably before that time, surely during all the ensuing centuries, men have been learning better to represent, by lines laid down on a flat surface, the earth and the sea over which they fared, fought, toiled, and dreamed.

With the advance of civilization, the taming of the wild hinterlands, the exploitation of the fertile valleys, the need for good maps grows ever keener. In promoting the great service of maps, progress is now delivering to the map maker new tools. "Bird's-eye" views we have all heard of since childhood. Views approaching those a high-flying bird may see must have come to men but rarely until the relatively recent advent of the airplane. From seeing such views it was but a short step to record them through the magic of modern photography and another short step to scale the pictures and use them as maps for the guidance of ground operations.

Aerial photographic mapping, as yet but a rumor to the many, came through its infancy and demonstrated some of its practical possibilities during the World War. Just when or where or by whom it was conceived is not known to the writer. It is today a new art well under way. Its greatness in the future will probably be

in proportion to the energy, brains and skill which are put into its further development. Its possibilities are still insufficiently tested, but to the initiated few it promises great things in many fields.

Dealing with vast areas—millions of acres—of undeveloped and too often poorly mapped, rugged and inaccessible mountain country, the foresters of western America and the increasing host of forest users are, perforce, much dependent on maps. Foresters must often be makers as well as users of maps. On maps they place their plans, spread the inventory of their forest resources and leave the record of their management in the process of producing a crop that must be started by one generation of men, tended by a second and harvested by a third or a fourth succeeding one. Imagine for a moment if we can, what it may mean to the foresters of 2030 and the intervening years, if they can produce a clear print on a large scale, of a square mile or a township, which will show in place every large tree, every barren spot, each brush patch, the roads and other improvements, together with much of topographic detail that was on that area in 1930.

From the air, the Northern Rocky Mountain Forest Experiment Station buildings are seen in the clearing on the right. Roads, creek, river, planted sample plots and variously timbered areas are clearly visible in this aerial photograph.

Foresters and timberland owners in Canada, with vast areas of maples or crudely mapped, mosquito-infested country to administer, started to rise above their troubles in 1919 and, we are told, in the succeeding years many thousands of square miles of Canadian forest, swamp and lake have been faithfully recorded on film and print.

This aerial photograph covers about one square mile and shows a last stronghold of agriculture in the foothills near the edge of the forest. Timber on the northerly slopes. Buildings, road, orchards, harvested grain, straw piles, and plowed fields are clearly visible.

United States timbermen and foresters gave little attention to aerial photo-mapping until quite recently. The United States Army Air Corps has photographed a large number of relatively small areas to obtain maps for special purposes. During and since 1926, the Army Air Corps, the United States Geological Survey and the United States Forest Service have collaborated in the aerial photo-mapping of a vast wild area in southeastern Alaska. In September, 1926, the Forest Service conceived the idea of using airplanes for the mapping of some of the areas swept by the disastrous forest fires of that year. An aerial photo-mapping camera of the so-called K-3 type was secured and late in the season the first experimental job was undertaken.

The camera used on this and subsequent work over the northern Idaho forests is a wonderful instrument somewhat on the order of a glorified and grown-up pocket Kodak, weighing about thirty-six pounds, stripped. It was fitted with a fine, double, combination lens of speed *f*.4.5 built to work at twelve-inch focal length with a high-speed "between-lens" shutter of special type. Exposures may be made at time varying from 1/150 up to 1/50 second. Focus is universal. With the camera are two magazines, light-proof, quickly detachable and interchangeable on the camera in the air. Each

Prominent forest types are readily distinguished and the area of each may be determined from the pictures. This picture shows dense and open stands of timber, nontimbered areas, and an old burn in the dense stand now thickly covered with young growth. Scale, six inches to one mile.

magazine may be loaded, in a good photographic dark room with a roll of film about seventy-five feet long by nine inches wide. It is sufficient for about 115 exposures.

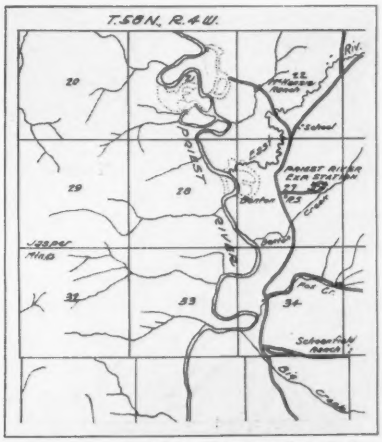
Aerial photo-mapping film is in itself a rare triumph of modern science and human skill. Technically, it is designated as "hypersensitive panchromatic" film, which is, perhaps, the quickest way of saying that the film is unusually sensitive to light of all colors. That it is so will ultimately become well known to the amateur who undertakes to handle it with his ordinary dark-room red light. Fairly treated, the film yields negatives of wonderful detail and contrast under the trying conditions of views in monotone, too direct lighting, short-time exposure and relatively great distance from the object.

Pictures for photo-mapping a rough, mountainous country are best taken with the camera looking straight downward. It is, accordingly, mounted to point downward through a hole in the floor of the plane. The mounting is cushioned with sponge rubber to reduce vibration from the engine and is freely flexible so that the operator may, if he is sufficiently skillful, keep the focal axis of the lens approximately plumb with the earth by means of a spirit level conveniently attached to the camera frame even though the plane does not remain exactly on an even keel.

Early in the experiment it was learned that there are some very strict limiting factors that must be carefully observed in taking pictures for photo-mapping purposes. Weather is one of the factors. Such pictures can be taken only in clear weather. It is surprising how few really clear days there are in the mountains. Ceiling, as the aviator terms it, is another factor. Pictures for aerial photo-mapping can be taken from most any reasonable altitude above ground; but—and this "but" is a most important one—the ground area covered by each picture, and therefore the scale of the picture, will be in direct proportion to the height of the lens above ground at the time the picture was taken. This question of area covered by each picture is in itself important, for it determines the number of pictures that must be taken to cover the area, the width between flight lines, the distance and therefore the time that must be flown fully to cover the area and, together with the speed of flight, it controls the length of time interval that should lapse between exposures. Pictures are usually spaced to overlap about fifty per cent in the direction of flight and about sixty percent laterally. This spacing means that if the work is perfectly done every foot of ground will be photographed more than four times. There are excellent technical reasons for the overlaps.

After the equipment had been properly installed in the plane a trial and reconnaissance flight was made over the area to acquaint the pilot with some guiding landmarks and to determine the value of a few such essential variables as ceiling of the plane and its approximate speed over the ground.

We agreed to photo our first job from 13,000 feet. Since the average elevation of the ground was about 3,000 feet above sea that meant that the area was to be photographed from approximately two miles above. Speed of flight over measured courses up there in the thin, cold blue proved to be about eighty-five miles an hour.



Tracing by F. J. Cool, U. S. F. S.

This is a section of a line map made from aerial photographs. The scale is about one inch to one mile.

Approximate speed of flight and service ceiling determined, a few simple computations quickly established the approximate scale of the pictures, width between strips, and interval between exposures. Since it required an hour and a half of hard grinding to get to

(*Continuing on page* 738)

A destructive forest fire left its mark here a few years ago. Note the dead timber standing and down and the islands of green trees that survive.

Fur Trees

By Claude E. Johnson

This oak "bears" a family of raccoons each year—for it is an old den tree.

I MEAN it just as I have spelled it—FUR trees. You may wonder if I think fur is something that grows on trees. Of course I do. At least some of it grows *in* trees. Now you have it. I am talking about den trees. It seems that we are just beginning to awaken to the importance of sparing the den tree. For my part, I do not recall having heard any plea for it until several years ago. Since then I have read a few articles on 'coon hunting in which, amid the noise of the chase, some hunter's voice was heard to say, "Don't do it, boys. Don't cut it. That's a den tree." And he was wise, for when an animal is taken and its den is destroyed nothing is left there to shelter another animal in its place.

When I was a small boy I went home from school one afternoon in early winter to find that my father had brought in a live opossum. Of course I wanted to know all about how and where he caught it, since it was an unusual thing for him to do, and he told me that the dogs had found it in a hollow tree out on the hillside which had been cut for firewood. Next morning I went out to see where he had caught it and I found a bed of dry leaves in the tree. Reaching through the hole, I started to examine the bed and, much to my surprise, uncovered another opossum. That was a good den tree ruined, but we thought nothing of it then.

Trees also afford protection to animals that cannot climb, and here bunny has taken refuge in an old hollow log.

When we consider that trees afford protection even to some animals that cannot climb, we realize more fully the breadth of their usefulness. Take the rabbit, for instance. What boy ever grew up in a wooded country without "peeling" his knuckles in pulling the lowly cottontail out of a hollow tree or log? On farmlands every tree with a cavity at the bottom big enough for a rabbit to enter is likely to bear the toothprints of dogs, mute evidence that bunny found protection there. Usually such trees have a hole or two chopped in by hunters, but still they afford refuge for the rabbit from all save the hunter.

Other animals, of course, use the cavities in the bottom of trees. Ample space there for a good bed of dry leaves may invite an opossum and it will keep him snug though snows fall. Even wolves will scratch out the large cavities in the bottoms of trees to make a hiding place for their cubs. It is a habit with the grey wolves of the Ozarks. Even some snakes, the black-snake, for instance, occasionally climb trees or enter cavities in them. It is rarely necessary, however, to destroy a tree to get rid of a predatory animal. And in regard to snakes, a hunter should know his locality and its snakes well enough to guard against putting his hands into a tree or log unless it is safe to do so. Even then heavy leather gloves are not amiss.

Some animals prefer the higher cavities in trees. The squirrel, we know, is one of them. The raccoon is another, and the opossum, while not averse to using the ground floor when it suits him, is more often found in the second or third story. Of course the 'coon, like others of the fur-bearers, sometimes dens in the ground. I have known him to act as if he even scorned trees. Last winter a 'coon led some good dogs a merry chase three miles or more over the wooded Ozark hills and finally "treed" in a den under a rock. But in that instance he did use trees along the way to

play his usual tricks on the hounds, and experience has taught me that he is partial to a snug, hollow tree when he can find it.

Not only trees but logs afford dens for wild animals. Opossums and skunks, especially the latter, use them freely. I shall never forget how I learned that when I was a boy. I went hunting just before daylight one November morning, and my dog treed in a big log. Not having time to cut into it, I plugged the entrance and went on to school, where I divided the day between studying the three R's and thinking about what I had in that log. After school I ran most of the way home, stopping there just long enough to set my dinner pail in the house and get an ax at the woodpile. The destruction of dens meant nothing to me then—we had so many—and I chopped a hole or two in the log and the secret got out. Then we had some fight around that log, and ever since that time I would rather have a certain animal face me than turn the other way. When the fight was over there was no doubt about what I had. Anybody with the sense of smell could have told. I ran back across the meadow home to show mother the prowess of her ten-year-old son and you should have seen the reception she gave me.

Publishers Photo Service

Even the tricky 'coon sometimes dens on the ground floor, and he is particularly partial to a snug, hollow tree when he can find it.

"Will a mother ever turn her boy out into the cold?" you ask me.

You can tell the world she will, when he's got a skunk on his shoulder!

What about animals that get into den trees and cannot be trapped or caught without destroying the tree? Shall we take them, regardless? Well, now, I know how difficult some animals are to tree, the 'coon for instance, and I know how hard it is to give up and let them go after they have given us a long chase. Sometimes it hardly seems fair to the dogs after they have worked so patiently on the trail, but after all, too, the hunted animal deserves a break.

I remember a big oak that stands in a creek bottom in the Ozarks. It seems to me that I chased a hundred gray squirrels up that tree in my boyhood, or maybe it was the same squirrel a hundred times. It was an old den tree, too hard to climb and too big to cut down for one squirrel. Many times I have imagined I could see a squirrel peeking out of the hole high up in that old oak, making faces at me and giving me the razz. And there were times when I would have liked to fire a cannon at that hole. But the old tree still stands, and gray squirrels use it yet, while in the years gone by many platters of fried squirrel have come from the vicinity of that tree. You get the significance. Not every squirrel got away into the old tree, but it helped to save "seed" from year to year.

When we consider that many of our closely settled farm sections were wild lands only a few generations ago, we get some idea of the countless acres of woods that have fallen before the ax. They are still falling. At the pace we have gone we may expect a treeless country some day. And with the passing of our trees will go much of the best of our wild life. We don't like to think of that, but what can we do about it? We can spare at least patches of woodland here and there if we are landowners. If not, as hunters, the least that we can do is to spare the den trees.

It would be well to remember, too, that in small tracts of woodland on farm lands the tendency is to cut out all faulty timber, leaving only the sound. That may be good practice from another standpoint, but it is bad for den trees. They must have cavities, and a few of them should be left on every woodlot. They are tenant property and the rent is easy to collect. Let the *fur* trees stand,—safe refuges of the small, hunted wild folk—spare the den tree.

Streets of Wood

By William Alphonso Murrill

(Photographs by the Author)

IN THESE hectic days, when people are seeking quiet for the sake of their nerves and more stringent laws are being enacted against the untimely yells of street peddlers crying their wares, it seems appropriate to mention the part that wood has played in the lessening of street noises, especially about hospitals, churches and schools, and, in some cases, in residential districts.

Wood blocks for paving were first used, in modern times, on Old Bailey Street, London, in 1839, and three years later were tried in Paris. But these early experiments failed because they were laid upon an inadequate foundation. A later method was to put down first a thick layer of concrete, then lay the wood paving upon that. The blocks used varied in size in different cities from six to eight inches in length and three to six inches in cross section. Hot bitumen, or coal-tar, poured upon the finished mosaic of blocks filled the cracks between them, and a final dressing of sharp sand and gravel gradually worked its way into the wood as the street was used, forming a highly resistant surfacing.

Laying a wood block pavement in Paris. Here blocks of Scotch and longleaf pine tested out best where traffic was heavy, with locust next best. The wood paving is laid on a base of concrete. Hot coal tar is poured over the finished surface, with a final dressing of sharp sand and gravel.

Old accounts tell us that wooden streets were built in Russia several centuries ago, but no details are furnished except that the blocks were hexagonal in shape. Their use was probably limited and soon discontinued. It is interesting to note, however, that the first blocks used in London were also hexagonal; they were laid upon a bed of rammed gravel. About 1870, London adopted an improved system of wood paving, in which the blocks were laid on a plank foundation and the joints filled with tar. A few years later the planking was abandoned for concrete.

Many different kinds of wood have been used for paving blocks, including fir, spruce, pine, oak, beech, locust, red cedar, and eucalyptus. In London, fir was first used, then yellow pine impregnated with creosote oil. Hardwoods of various species also were imported from Australia for this purpose, beginning in 1888, and these came into demand in Paris in 1893. Good eucalyptus contains gums, and aromatic principles which prevent the wood from decaying and it is therefore eminently suitable for streets. Australia was successful with wood paving from the start because of an abundance of durable woods well suited for the purpose.

In Paris, blocks of Scotch and longleaf pine were found to last the longest where traffic was heavy, although considerable locust was used with success. The climate of Paris is better suited to wood paving than that of London, and in 1897, there were over a million and a quarter square yards of it on her streets. Washington, following the example of

Left—Red Cedar at one time was employed in great quantities for paving in the Middle West. In 1900 there were 763 miles of cedar pavement in the City of Chicago alone, laid largely on a sand and hemlock foundation.
Right—Cypress did not test out practically as a paving wood and after several trials in cities of the Middle West, was abandoned because there was so much sapwood, which decays when not treated.

first used in Quebec in 1855. In 1890, they were in use in Montreal, being treated with creosote, laid on concrete, and topped off with coal-tar and gravel.

Chicago and Detroit, with great stands of red cedar at hand, employed this wood in quantity for paving, cutting cylindric blocks from the trunks, and setting them on end. This pavement was very cheap and remained in good condition for five years or more. It was speedily adopted by St. Paul, Minneapolis, Omaha, Kansas City, and other cities of the Central West. Blocks without the sapwood lasted longer. Cypress was tried but given up because there was considerable sapwood, which readily decayed when not treated. In 1900, there were 763 miles of cedar pavement in Chicago, most of it on a foundation of sand and two-inch hemlock planks, with gravel rammed into the joints and hot tar and gravel as a surfacing.

Paris, has experimented more with wood paving than any other city in the United States. From 1871 to 1873, more than a million square yards of wood paving were laid, representing a dozen different patents, such as the DeGolyer, the Taylor and Filbert, and the Miller and Stowe. All of these early experiments, however, together with those made in Boston and Chicago, were failures, owing to the use of unsuitable wood or lack of precautions to prevent its decay. The last wood blocks were removed from the streets of Washington in 1889.

From 1870 to 1900, millions of square yards of wood paving blocks were laid in cities of the United States and Canada. They were made of pine, hemlock, tamarack, bald cypress, mesquite, redwood, red cedar, osage orange, and other native woods. The blocks were laid upon sand, planking or concrete; many were creosoted. Tamarack blocks were

Left—Osage Orange was a favorite native wood used for paving during the period from 1870 to 1900, when millions of square yards of wood blocks were laid in the United States and Canada.
Right—Bark of the Longleaf pine. Early in 1900 Indianapolis changed from cedar to the use of creosoted longleaf pine for her wooden streets, laying the blocks on a six-inch base of cement concrete.

After the Australian hardwoods were adopted in London and Paris, about 1895, Twentieth Street between Fifth Avenue and Broadway, in New York, was paved with Karri wood as an experiment and after five years of wear it was reported "just as good as new." The life of this wood in London had been found to be at least ten years and in Sydney, Australia, more than twenty years.

By the beginning of the present century, the drift from wood to asphalt and concrete had become very pronounced in most cities of the United States. Indianapolis still used untreated cedar blocks and then changed to creosoted longleaf pine, which had given such good results in Paris and Galveston, laying the blocks on a six-inch base of cement concrete. In Chicago, there were still about fifteen million square yards of wood-paving. Eucalyptus, which was too expensive, anyhow, for general use in this country, proved somewhat disappointing because it was too dense to impregnate with poisons and more slippery than our native woods. The experimental blocks of this wood were removed from New York streets in 1904.

The use of untreated wood blocks was discontinued and creosoting became the rule. Treated sapwood lasted about as long as heartwood, so it was not considered necessary to remove it. In 1905, there were about a million and a half square yards of creosoted wood pavements in the United States, of which 400,000 square yards were in Indianapolis and 178,000 square yards in New York City. The vacuum-pressure process of applying the creosote, employed generally in America, is more satisfactory than simply soaking the blocks in a vat of creosote, the Parisian method at that time. The foundation was made of Portland cement, one part; sand, three parts; and crushed stone, seven parts; while pitch was used to fill the joints. The average cost of such pavement was about three dollars a yard.

In 1906, a very important experiment in wood paving was undertaken by the City of Minneapolis in cooperation with the United States Forest Service, the woods used being Douglas fir, hemlock, longleaf pine, Norway pine, tamarack, western larch, and white birch. All of the blocks were creosoted and laid upon concrete. In 1911, the Douglas fir was re-laid with a better quality of the same wood. After fifteen years of service all the other kinds of woods were still in place, but some were badly worn and decayed.

Longleaf pine proved to be the most durable, with birch and Norway pine ranking next. It was found difficult to get birch wood free from decay. Western larch stood last, and our eastern hemlock, which long ago proved a failure in untreated form in Washington and Philadelphia, was almost as bad. The length of the blocks proved immaterial but there was less joint wear when they were laid at angles of forty-five degrees and sixty-seven degrees to the curb.

Recently E. R. Dutton, assistant city engineer of Minneapolis, stated that all of this experimental pavement was removed in 1928 and that the longleaf pine proved to be the best wood tried for street paving. The hemlock was almost all shattered, he declared, and some of the tamarack badly rotted.

T. H. Byrne, superintendent of streets in Chicago, reports about seventy miles of creosote wood block still on the streets, but all of it in poor condition. None has been laid in the last five years. Joseph Johnson, commissioner of public works in New York City, recently stated: "We have not paved any of our streets with wood blocks since 1925. There are still 540,000 square yards of wood blocks on our streets, made of southern yellow pine. The first wood block pavement was laid by the city in 1904 and a small area laid in that year is still in existence."

According to the Forest Products Laboratories of Canada no new streets have been paved with wood blocks during the past four or five years in Canada. Several cities, however, are still re-paving their old wood-block streets. A great deal of wood-block pavement has been used in Canada. About ten or fifteen years ago its use was fairly extensive, Norway pine and Douglas fir being the two species most commonly used.

The United States Forest Service reports that the quantity of wood blocks treated in this country in 1927 amounted to 2,008,160 square yards, an increase of 602,665 square yards over 1926. In 1928, however, there was a decrease of 607,000. Most of the blocks reported treated in 1927 were of southern yellow pine, the actual quantity of this wood being 1,688,853 square yards, or more than eighty-four per cent. The other wood represented in any quantity was Douglas fir. Of the total quantity of wood blocks treated during the period covered by this report, 1,539,313 square yards were intended for use as inside flooring and 468,847 square yards for outside paving. Creosote and paving oil were the two preservatives used in 1927.

In London, pine from northern Europe is employed, while in Paris the northern pine has now been almost entirely superseded by native maritime pine. The cost of our yellow pine would, of course, be entirely prohibitive in Europe.

In South America, the use of asphalt, cement, rock and other substantial materials in preference to wood is the general practice. A recent paving contract in Brazil calls for asphalt or a similar material only. Compressed rock asphalt roadway was first laid in Paris in 1854, and in Washington, on Pennsylvania Avenue, in 1876.

When I visited Buenos Aires in 1924, there were 1,200 miles of paved streets, eighty per cent being of granite blocks, but these blocks were being covered on many of the boulevards with asphalt on account of the rapidly increasing motor traffic. I also found considerable wood paving in the heart of the city and it was in splendid condition. Two kinds of wood were used, *algaroba* and *quebracho*. The former, known also as mesquite or Prosopis, had been tried with success in San Antonio, Texas.

The other wood was *quebracho blanco del Tucuman,* from the forests of northern Argentina, a heavy hardwood much employed for railway ties and very durable. Its botanical name is *Aspidosperma quebracho.*

Wood pavement is excellent for street use when well laid, but its cost has mounted to a rate that is considered prohibitive. Its use for street paving has given way to blocks for factory floors and other interiors. Rammed clay, sawdust, charcoal, logs, boards, rocks, bricks, wood blocks, macadam, concrete cement, asphalt—and the next rubber!

EDITORIALS

"More Game Birds in America"

WEALTHY Americans have for years given freely of their private fortunes for the advancement of social causes. Thus far, however, there have been few private gifts for the advancement of the conservation of natural resources—one of the most fundamental of all social betterments. It is, therefore, highly encouraging to read the recent announcement of the establishment of a large foundation to be dedicated to "more game birds in America." The foundation has been conceived and is sponsored by Joseph P. Knapp, publisher, of New York. Senator Harry B. Hawes of Missouri, a conservationist of national prominence, has been selected as president of the foundation. A fund of $10,000,000, of which $1,000,000 has been subscribed, is contemplated, the return from which is to be used to breed game birds in America.

According to the tentative prospectus of the foundation, it proposes to teach ideas rather than to give things. This is as it should be. A reading of the prospectus, however, forces the conclusion that the particular ideas to be taught may be narrowly restricted to one major doctrine of the donor's own choosing. It is proposed to plant the European system of private game ownership in the United States in place of the system of public game ownership now in effect and with which our country has grown up.

Whether or not the introduction of the European system will represent a net gain or a net loss is an open question. No one knows which system in the end will be best adapted to our democratic life and thought. At the present time, however, the weight of opinion of sportsmen-conservationists in this country is unquestionably heavily on the negative side of this question. The present trend is to try out various ramifications of the American system, as witnessed by the promising experiments in Michigan, Texas, Pennsylvania, Georgia and other states. Each of these experiments seeks a local solution of the problem of farm game, based upon the principle of public ownership rather than private ownership of game. No two of these experiments are alike except that their doctrines are indigenous, not imported. They represent the evolution of a system of game management distinctly American.

It is premature, to say the least, to conclude that the American system will not work. The system simply has not been adequately tried and developed. The private landowner has been left out with the result that except on public lands, the system has existed more on the statute books and in state and governmental bureaus than on the farm and in the woods. In this respect it closely parallels American forestry. Both have the same single and outstanding need, namely, to be tried out on private land. Money judiciously placed with competent local agencies would enable them greatly to speed up the necessary processes of trial and error. The greater the variety of schemes tried the sooner will a workable one be found. It is probable that no one scheme will be wholly applicable for the nation as a whole. The United States is a large country, geographically in miles and acres, morally in folk-ways and traditions, biologically in fin, feather and fur. If we judge rightly the tenor of thought among American sportsmen, attempts to import a European system, brought down from days of feudalism, will not meet with ready acceptance.

Incidentally the activities of the foundation, it appears, will be restricted to game birds only. This is as well a means of conserving and concentrating initial energy, but the laws of nature will undoubtedly later force a broadening of the foundation's field. The same brushy woodlot which conserves the quail, conserves the rabbit; the fire which drives out the grouse, likewise drives out the deer; the skilled personnel created to apply management to game birds will be competent to apply management to game mammals and to coordinate both with other conservation activities.

The prospectus emphasizes publicity as an educational need but fails to give research the emphasis it merits. Here again experience will doubtless amend the lack as it has done in the case of the arms and ammunition industry which some years ago began propaganda of its own prescription for the promotion of game. Coming face to face with the absolute need of research, the industry has recently established an institute in support of game research through agricultural colleges and the forest schools. Similar recognition of the need of research and similar trust in competent local, state and national agencies to study specific game problems may well commend themselves to the Knapp foundation.

Mr. Knapp by his enterprise in raising funds has created for himself a unique opportunity to make game conservation a reality in America. His foundation has it within its power to demonstrate that private wealth can effectively promote conservation. Such gifts we believe are most effective, not when they give the public something of the donors choosing but rather when they create public ability to practice conservation in its own way and on its own account. After all, real reforms are home made—attained by evolution, not prescription, of ideas.

Galagina's Day

For a single day Galagina, the forest gobbler, will be prince regal. While millions of Americans will this month choose his domesticated brother, a privileged few, carrying on the tradition of our Pilgrim Fathers of years past, will grace their Thanksgiving table with Galagina, the wild turkey. For a day this magnificently plumaged game bird which is so gloriously interwoven into early American history, and which at one time was advocated as the national emblem by no less a personage than Benjamin Franklin, will be acclaimed, eulogized and glorified. Then Galagina, the real prince of America's woodlands, will continue his bleak wanderings into oblivion.

Certainly there is no greater blemish staining the annals of American wild life than the vanishing of this strutting prince of the woodlands. Intelligent he is, with an uncanny ability to survive his natural enemies among the beasts and birds. But a relentless human persecution and the destruction of his natural habitat, without a reasonable balance of legal or moral protection, has written his demise.

The passing of the passenger pigeon, heath hen, whooping crane and the buffalo reflect ugly chapters of American wild life history. The passing of Galagina would be unforgivable, a calamity that would break down the higher purposes of wild life conservation, and at the same time humble one of the most sacred of American traditions—the feast at Thanksgiving.

Mr. Kelley and Oil Conservation

ANOTHER sensational flash was given last month to the Department of the Interior's handling of public oil properties. Ralph S. Kelley, for twenty-six years an employee of the Department and for the last six years chief of the Field Division of the General Land Office at Denver, supplied the match that will undoubtedly touch off another oil investigation by Congress. On September 28 Mr. Kelley resigned his office as chief of staff in Denver in protest against alleged concessions extended over his head to large oil interests. In his letter of resignation, Mr. Kelley stated that "concession after concession has been granted Colorado oil applicants not because they were rightfully entitled to such consideration but purely and simply as conciliatory measures because of great political or other pressure brought to bear upon the Secretary." Attempts to placate and appease the oil interests at the expense of the rights of the public, Mr. Kelley declared, have been as noticeable since March 4, 1929, as heretofore. His continued protests against what he terms a great wrong being done the public which owns the lands involved, he charges, have been ignored or overruled by his superiors in Washington.

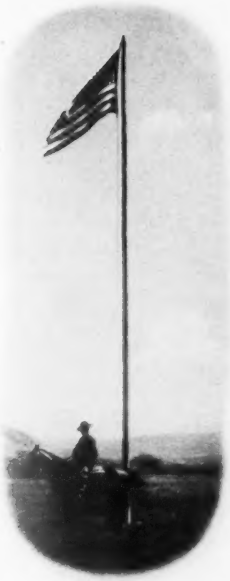
The public mineral domain at stake, according to Mr. Kelley, consists of some 800,000 acres of shale oil lands in Colorado valued at the most conservative estimate of 40,000,000,000 barrels of crude shale oil. This is not Mr. Kelley's own figure, so we are told, but the estimate made by the United States Geological Survey "which has always been known for competency and conservatism." Other estimates, Mr. Kelley says, made by well-known engineers and geologists multiply this figure by ten. But on the basis of the Geological Survey estimate, Mr. Kelley places the present value of the oil land involved at $40,000,000,000, a sum equal to one-tenth the entire wealth of the United States.

In his letter of resignation, Mr. Kelley's charges were stated in general terms. He has since begun the publication of a series of articles in the *New York World* in which he promises to tell his story as simply and specifically as possible. From the articles already appearing, the basis of his revelations apparently rest upon the reversal by former Secretary Hubert Work in 1926 of a departmental decision, twice upheld, pertaining to what constitutes discovery of oil under the mining law. Mr. Kelley claims that this reversal was extracted from former Secretary Work at an exparte conference by high-priced lawyers and representatives of large oil companies. The effect of the reversal, he claims, has been to open the door for oil companies to secure thousands of acres of public oil land worth billions of dollars without valid discovery of oil in the meaning of the law as interpreted by the Department up to the time of the conference in question. Secretary Work's decision, it is charged, has not been changed by the present Secretary, Ray Lyman Wilbur, with the result that public oil properties are continuing to pass illegally into the hands of commercial oil interests.

Secretary Wilbur refused to accept Mr. Kelley's resignation but suspended him forthwith and called upon the Attorney General to make a searching investigation of the charges. Assistant Attorney General Seth W. Richardson was assigned to the task and began his investigation at once. In the meantime the public has rightfully refused to be stampeded by Mr. Kelley's charges. Public confidence in Secretary Wilbur, we believe, has not been shaken and should not be in advance of clear proof that the charges against him and his department are founded upon fact. Mr. Kelley may be another Glavis or he may not. Nevertheless, his charges have placed the Department of the Interior upon the defensive, and both Congress and the public will demand and judge the evidence.

From a Forest Ranger to His Dad

By Charles Newton Elliott



To those who have any illusions concerning a forest ranger's life, this series of letters, which began in the October issue and which will be concluded in the December issue, will prove enlightening. A young eastern forester, just out of college, finds that the making of a forest ranger calls for unique ability, enthusiasm and unfaltering courage.

Rock Creek Ranger Station, Montana.

Dear Dad:

I have just come in from the wildest, roughest country that I have ever seen. There were valleys that yawned and dropped out of sight under our feet, mountains that soared above us. And old Penrose, sticking up in the distance, a sort of goal toward which we were working.

Howard sent Charlie and George, a new fellow, and me up on the west fork of Swamp Creek to the last base camp. We were to carry the telephone line from there to the top of Penrose. Our method was simple. Charlie loaded the wire on horses and distributed it along the trail, three rolls to the mile. I unrolled the wire by putting a stick through the center of the spool and walking along the trail—if there happened to be a trail. George used a forked stick, putting the wire over limbs of trees and on bushes, where there were no trees.

Day after day we climbed toward Penrose. We saw one another only at meal time and at night. I saw several bears and innumerable signs of them. Once I met one on a narrow trail, on the edge of a twenty-foot cliff. I don't know how many seconds we stood staring at one another. But the bear relieved the situation by jumping first.

Every day we climbed, it got colder. We could see the big patches of snow on Penrose when we climbed over the shorter mountains, taking short-cuts. The country through which we traveled was barren and desolate. At one time or another all the trees had been killed by fire. Rock cliffs were prominent and we could hear the streams roaring far below us in the valley. All was still and quiet except for the wind. We had to keep a campfire burning some of the nights and our sleep came in snatches. Daylight always found us cooking oatmeal and coffee over a small, roaring fire, and usually a big red-tail hawk sailed overhead to see what it was all about.

The woods are as green as the day they were made, and the air is the sweetest I have ever tasted.

On the last day Howard came up to help us finish stringing the wire to the top of the main ridge leading to Penrose. I brought wire from the last base camp in the valley, and arrived just ahead of the long pack string that brought up supplies. We reached the top a little before dark, finished stringing the wire, and Howard and I dropped half a mile back into the valley, looking for water. By the time we had cooked supper, chosen the most comfortable rocks

for our beds, and tied everything down to keep the wind from blowing it away, it was eleven o'clock.

The next morning we helped Charlie arrange his camp, put up his tent and straighten things out in general. Shortly after noon we left Penrose and came down to Howard's car at the forks of Dee Creek. We made Plains in time for supper. Hardly were we settled in the ranger station, however, before the telephone rang and the lookout on Baldy reported a fire. We piled into the truck and hit the road again. The fire was in the rock cliffs on the mountain above Paradise and could not have been in a rougher place for night fighting. Howard and Ed and Bob and I were there all night, climbing from one cliff to another like mountain goats, covering up stump holes, chopping down burning trees, making fire lines and starving. We had it almost under control by daylight when Paul, Chet and Buck came up and relieved us. We went back to Plains to get some good, solid food. I had determined not to sleep during the day, but after breakfast I sat down in the sun and lit my pipe. The next thing I knew, someone was shouting "grub" and as hungry as I was, I could hardly wake up.

Yesterday we picked out a mass of equipment for my lookout on Thompson Peak. Tents, cooking utensils, tools and grub all came out of the cellar and we loaded it on the truck. I spent last night with Chet at the ranger station at Rock Creek, sitting before the stove and having the best kind of time listening to the tales of this country. This morning we have been waiting for the truck to bring in some wire so we can begin the phone line to Thompson Peak. John came over from the Fishtrap Creek Camp with Mike, and we have been passing away the hours by shooting at squirrels in the meadow.

I like the country around Thompson much better than that around Penrose. The woods are as green as the day they were made and the mountains are straight up and down. Early this morning Chet showed me a big buck deer standing in the front yard. This is big-game country and I hope to see the biggest game in it.

The truck has just rolled up in front of the station and I had better go out and help Bob unload that wire before he comes in and drags me out. We begin stringing it in the morning. Shorty ought to get up here in a day or two and move me on to the top. Then my summer's work will begin in earnest.

Must get outside and help. S'long, Dad.

CHARLIE.

Thursday Shorty came into the ranger station with his pack string, and early Friday morning we turned our faces toward the wild country.

Thompson Peak,
Montana.

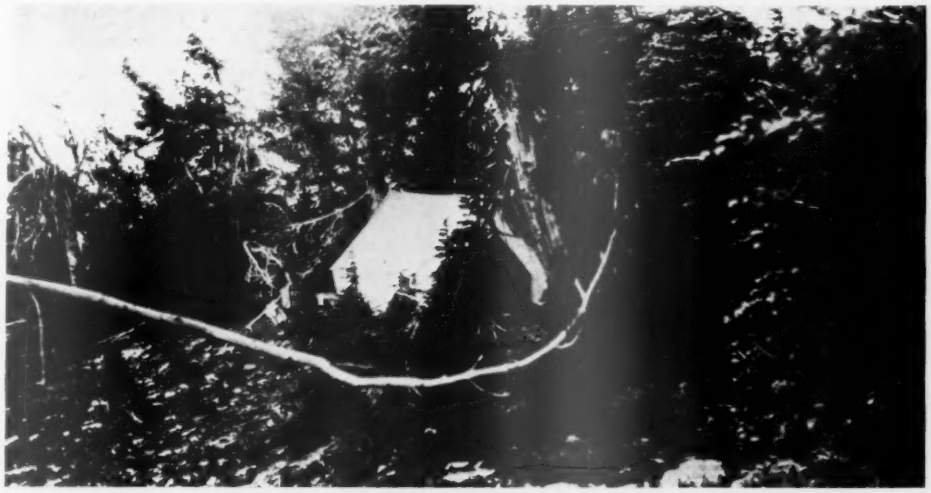
MY DEAR DAD:

Here I am at last, sitting on a cold, flat rock on one of the highest mountains in the Cabinet Range, looking out and down upon the world. The air up here is thin, but it is the sweetest I have ever tasted.

They say, Dad, that a ranger's trail is the longest and roughest distance between two points, and I am convinced that we made a ranger's trail from Rock Creek Ranger Station to Thompson Peak.

During the first three days I hauled wire to the top of Cook Mountain, which stands between the ranger station and the peak, and I had to use the worst, meanest mule I have ever run across. The first day I went out with that ornery sack of skin and bones, I packed eight spools of wire. The horse was a little lame, so I pulled Oprobrius two miles to the foot of Cook mountain. When he saw that long, steep incline in front of him he bucked and we fought over about two acres of forest. He threw me against every other tree at the foot of the mountain and finally bucked the wire off and made for the ranger station. I stacked the wire under a tree and followed him home. After two hours of chasing him around the barn, I caught the rope he was using as a necktie and we had our little squabble all over. Both of us were well lathered when he finally consented to being packed again. I packed ten spools of wire on him this time, all I could find, and

carried him to the top of Cook, five miles away and six thousand feet in the air before I unloaded one spool. When I took off his pack saddle that night, he looked at me sort of sad and wistful, like he thought I was carrying a good joke too far.



The tent was pitched on the only level spot on the mountain, forty feet from the top and twenty feet from the edge of a thousand-foot cliff.

The next few days I helped John and Mike string wire to the crest of Cook. We strung it in the tops of trees, over limbs and in fact, anywhere to get it off the ground and yet leave it loose enough so it wouldn't break if a tree blew across it. It was just a temporary line, you understand.

Shorty came trotting into the ranger station Thursday with his pack string. He patched up some of his alforcases and shoed some of his mules. Early Friday morning we loaded the supplies, ate a big breakfast and turned our faces toward the wild country. John and Mike and I walked ahead of the pack string cutting trees, logs and brush, making gaps in some of the thicker timber so the pack string could get through.

Friday night found us camped on the northwest side of Little Thompson Peak. We had to dig a level place for our fire, and we made a mighty big one. Our supper consisted of dried venison Shorty had in his saddle bags, spuds, and bread and coffee. It seems that the nearer I get toward heaven the better the meals taste. After supper we sat around the fire as usual. I imagine we made the kind of picture you see on wild-west calendars—with me as the goggle-eyed tenderfoot listening in on the rough palaver of stern-faced men. The only trouble here was that John looked like a banker, Mike was just a regular fellow and Shorty had a heart of gold, though he does look like Dan McGrew. To make the scene complete, the wind whipped off those snow-covered peaks all around us and the spruce thickets were singing doleful songs. The stars were up there, close and cold, and almost as brilliant as the white way at home.

The map table was set up on an old tree near the top, where readings on fires could be easily made.

We ascended the last steep stretch to the top of Thompson shortly after noon Saturday. Storm clouds blew up and it began to rain—a cold rain that whipped into our faces while we put up the tent, hobbled the horses and arranged things for the night. The tent, Dad, was pitched on the only level spot on the mountain, forty feet from the top and twenty feet from the edge of a thousand-foot cliff. So good-bye, in case I acquire a habit of walking in my sleep!

The fellows left me Sunday morning. The last I heard of them was a wild call from Little Thompson Peak. I was left absolutely alone on the mountain that overlooked all the eastern side of the Cabinet Forest and the entire Blackfeet Indian Reservation. Ten miles, Dad, from any human being, with bears and deers for company. I allowed myself a pipeful of tobacco and a long hour of speculation before I went to work, arranging supplies, cutting stove wood and tying down my tent so it would not drag me over the cliff.

I haven't even a telephone. The chipmunks regard me curiously as I walk back and forth in front of the tent. They seem tame enough and I am going to have them eating out of my hand before the summer is over. I know, however, that Mike and John are stringing wire in this direction and they should be here in a few days. Then, too, Paul is coming up next week and help me build a tower in the tops of three trees on the peak. After they leave I shall be left alone until snow flies.

I have assorted my equipment, cut a pile of wood, made my bed, and now there is nothing to do until somebody

brings me a telephone line up here. This morning I walked all around the mountain trying to find a spring. The nearest water is a mile straight down the hill, and when I say straight, I mean straight. Every drop of water I use in camp will mean one drop of sweat. It's pleasant to look forward to.

I hope that big bear Howard and I are going to hunt doesn't show up on this mountain. I've a good rifle but don't like the task of cleaning it when I have to shoot at bears to get it dirty. I'm still looking forward to that hunt this fall. I have a premonition that something grand is going to happen.

Just now, Dad, I had better close and carry in some wood before it gets dark, and also put some more rocks on the tent flap. For the past hour the wind has been getting colder and stronger and though I don't mind waking up in the valley, I don't want the walk back to the top.

So long, Dad, until next time. CHARLIE.

Thompson Peak, Montana.

DEAR DAD:

I have just returned from the spring and after that long climb with a five-gallon water pack on my back and a two-gallon water bag in each hand, I'm too shaky to be writing. But everything is quiet and clear, the wind is not trying to blow me off the tower like it usually does, so I'll do my best.

The one reason why I do not like to live on this mountain is that I have to go so far for water. I have found a spring on three sides of the peak, and I hardly know which is worse, scaling a thousand-foot cliff, climbing rock slides, or fighting thickets of willow and alder bushes. It takes me three hours to go for water, but nine gallons will last me two or three days. They taught me in school that "a pint's a pound the world around" but I've learned that a pint's a dozen pounds when the world's straight up and down.

Sometimes I see a deer or bear on my way to the spring. They don't seem a bit wild. I called up Howard the other night and asked him why they were so tame. He laughed and said, "Just wait until the season opens and you'll be surprised. You won't see them anywhere." The deer usually walk a few feet out of my way and the bears go lumbering off across the mountain. The other day I met a black bear with two cubs. She sat up in the path and the cubs went close to her side. She looked like she might have weighed a ton sitting there on her haunches, and you can bet I didn't mind walking about a quarter of a mile out of the way going around her!

I discovered a fire yesterday from my lookout station. It seems to be burning on the Indian reservation across the line of the Cabinet National Forest. I took the bearings on it from my peak, made an approximate estimate on the township range and district it was in and reported it to the station at Plains. Howard said they would put through a call to the men on the reservation and let them fight it. Looks like nobody is trying to put it out though, because it has grown larger. I told them about it today when I called and Paul, who was talking with me, said they would take care of it and not to worry. All I can do is sit and watch it burn until I get further orders.

Howard called last night after dark—that is when all the social conversation goes on up here, Dad. He told me that some big bear had been raising havoc again among the sheep on the range. There are about ten thousand head of the "woolies" on the forest this summer. I have probably told you before that live stock are grazed on the National Forests the entire summer for a few cents a head. Howard said the bear killed twenty sheep one night and thirty the next. For some reason Howard seems to think that this bear is the same one with which he had his little escapade in the spring and the one we are going after this fall. Somehow I believe the trip is going to be a good one. I have never been on a bear hunt and I may not know how to act, but I suppose it's like eating soup in society—watch the other fellow and do as he does.

Howard also told me that the fellows are going to begin cutting a "way trail" in here in a couple of weeks. Way trails differ from other trails out here in that no tread, or place to walk, is made. The logs are taken out only when they are over ten inches in height and the swath cut through the forest is only six feet wide, just enough for a pack string to squeeze through. When they get to the top of Little Thompson I am supposed to begin cutting trail from the top of this peak toward them. Howard figures that by the time they reach Little Thompson the fire hazard ought to be about over and I can get away from the lookout point without leaving the forest around me in danger.

I have the little chipmunks so they will almost eat out of my hand. If I sit perfectly still they will come within a few inches of me, but at the least movement they scamper away as though I had turned machine guns on them. I believe that by the time I really begin to enjoy them I will have to leave the peak. If I didn't have the flock of little chicadees that fly around here and eat the oatmeal I put out for them, and the pair of hawks that are forever darting at my head when I'm not looking, and the chipmunks to keep me company, I would get mighty lonesome up here, Dad. I have written about a hundred letters, read all the magazines I brought up and every night I hold a long conversation over the 'phone with some of the fellows. Sometimes I drag out my banjo and play for old Tom up at Ben Ranger Station. The other night we had a fourteen-sided conversation over the phone. I believe that every phone on the forest had someone swinging on its receiver and sometimes several of them would be talking at once. It sounded like Holy-Roller meetings I have been to down in Georgia.

As ever, your son,

CHARLIE.

Lumber for Twenty Homes in a Single Tree

By EMANUEL FRITZ

CALIFORNIA redwood (*Sequoia sempervirens*), occasionally reaches a diameter of twenty feet when measured at about five feet from the excessive swelling or flare nearer the ground. Reports of even larger trees are common but too frequently their dimensions shrink when a tape is actually placed around them and large buttresses, bumps or burls and root swellings are discounted. It is of particular interest therefore to look over the dimensions of what is actually a twenty-foot tree measured by a reliable engineer and to learn what an inconceivably large amount of lumber such a huge tree might yield.

Recently, Captain A. W. Elam, forest engineer of the Little River Redwood Company, at Crannel, in Humboldt County, California, came across a large and particularly fine tree while cruising on the company's holdings. His report created so much interest among his employers that he was instructed to make careful measurements of the tree, even though it was in a remote portion of the property. He found this tree to be 308 feet high and to have a diameter of twenty feet, measured five feet above the ground. The bark measured eleven inches in thickness, leaving the diameter of the woody portion, eighteen feet, two inches. Captain Elam's tree is not unusual as to height; a number of individual trees have been measured by foresters and lumbermen that greatly exceed 300 feet but they lack the diameter and gentle taper of the tree here described. For example, one tree recently measured by engineers of the Pacific Lumber Company was found to have a height of 364 feet, but its diameter was only twelve feet. Particularly remarkable is the fullness of the trunk of the Little River Company's tree. The taper from the ground is so slight, that at a point 230 feet from the ground the diameter is still over twelve feet. Up to this point the tree would give fourteen logs, each of the standard sixteen-foot length. If the tree is perfectly sound throughout, these fourteen logs should yield the astounding total of over 360,000 board feet of merchantable lumber—sufficient for the lumber requirements of twenty-two average homes. In arriving at this total, Captain Elam made due allowance for some breakage in falling and for the heavy bark.

Comparison stresses the immensity of the Redwoods. These men are above the average in size yet they look diminutive against the giant trunk.

Many years ago a large church was built in Santa Rosa, California, every stick of which is said to have been cut from the same tree. Not long ago, a scaler, measuring the logs on a recently felled tract, found portions of it to contain as much as 1,000,000 board feet an acre. This figure may mean very little to one not accustomed to estimating timber, but, when it is recalled that very little timber in the eastern United States and, many portions of the West will average 25,000 board feet an acre over large areas, it is easy to visualize such an acre of redwood as equivalent to forty good acres elsewhere, or to see in Captain Elam's one tree the equivalent of nearly fifteen acres of rather good eastern timber.

Tales of the Diamond-Back

By

ARCHIBALD RUTLEDGE

DIXIELAND enjoys the somewhat dubious distinction of being the home of the largest, handsomest, and most formidable venomous serpent of the Western Hemisphere. The bushmaster of South American forests may occasionally rival the lordly diamond-back in length, but not in bulk; and I have records of the diamond-back that no bushmaster can match. The great king cobra is the only other serpent worthy to rank with the two mentioned. Of the three, the diamond-back is the most interesting, as I shall hope to show.

Having since boyhood roamed those wilds where this superb reptile is at home, it is natural that I have had some encounters with him. I have met fewer of these master serpents than one would suppose, considering my attempts to meet them; but that fact is due to a circumstance that is not generally understood; the rattlesnake spends much of his time underground—even when he is not hibernating. He has a den, just like a fox, a chipmunk, or a ground hog, as the following story will illustrate.

One day my brother was driving to a hunting estate of which he had charge. He found one of his watchmen setting a varmint trap at the side of the pineland road. As my brother came up, the man gave a yell and jumped back. He had suddenly found himself within easy striking distance of a huge rattlesnake which was all ready for business. Neither he nor my brother had a gun or a good stick, and they had to let the serpent crawl in a hole near by. Securing a pick and shovel from a house not far away, they proceeded gingerly to attempt to dig the snake out. They went down three feet; but they did not penetrate to the bottom of the den, and they did not come upon the fugitive. However, they were amazed to find the den elaborately constructed, with several tunnels, and at one place a long shelf of earth, on which no doubt his lordship was accustomed to take many a long subterranean siesta. There were leaves and dried grass in the place; but these I do not think had been carried there by the snake, which, being cold-blooded, has no particular relish of bedding. What probably had happened was that the serpent had appropriated to himself the underground home of some member of the rodent family, after first having disposed of the unfortunate owner.

It does not seem that the diamond-back spends much time above ground—at least in the latitudes in which I am most familiar with him. He roams abroad, kills a rabbit or a squirrel, and returns to his den for the long processes of digestion. As is well known, serpents are among the most abstemious of feeders; rattlesnakes have repeatedly been known to go a full year without eating. A single rat a month is sufficient for a big diamond-back.

The range of the true diamond-back rattler would be south of a line drawn from the middle of South Carolina westward. The coast country of Carolina and Georgia, Florida, and the Gulf Coast are its natural habitat. The largest specimen I ever measured was seven feet, two inches, minus the head. This serpent was killed not far from Charleston in June, 1929. I have seen a good many between six and seven feet in length. At any time, and anywhere, a rattler over five feet is impressive. The record for this interesting variety was killed by a negro near Florence, Alabama. The hide of this chimera, still preserved, measures fourteen

A typical piney woods scene in the range of the diamond-back rattlesnake.

feet! The negro shot it while hunting in the hills near Florence. It was so heavy that he could not move it. Later it was hauled to town on a wagon. I secured under affidavit all the details concerning this record snake, and then submitted the evidence to Raymond Ditmars, curator of reptiles in the Bronx Zoo, asking if he thought the thing credible. His answer was illuminating. He said that giants occur in all species, including man, and that undoubtedly this Florence monster was a true giant.

The length of such a serpent usually determines the width of the hide, when normally stretched. The ratio is approximately six to one; that is, a six-foot snake will have a hide twelve inches wide; or, to put it another way, the circumference at the point of greatest girth is one-sixth the length.

The female diamond-back is larger, more alert, and far more irritable than the male, perfectly fulfilling Kipling's general contention that the female is more deadly than the male. I once had a curious and rather hazardous proof of the truth of this. Roaming the pinelands, I was passing a burnt stump when something in the tiny game trail I was following caught my eye. It was a big rattler across my pathway, though the greater part of his length was behind the stump. I am positive that my foot brushed him as I sprang away, but he never moved. It was a male—sluggish and apparently unresentful. While I was watching with surprise his indifference, I heard another one rattling. At least forty feet away, high in a great coil, was the female, telling me as plainly as her dry bells could sing, that I could tramp on her mate all I pleased, but I had better keep my distance from her. I am not saying that a man can count on a male's being indifferent to being approached; but it is true that as a rule the real head of the family is the more formidable.

His Majesty—the Diamond-back—the largest, handsomest, and most formidable venomous serpent of the Western Hemisphere, in his Dixieland home.

In these days of constant travel over good roads that wander through the wilds, the traveler not infrequently meets a rattler in the road; and his natural instinct is to run over him and thus disable him until he can be properly dispatched. There is an element of peril in doing this that is not usually foreseen, and is therefore all the more acute. At the first touch of the wheel, the snake will strike, and the chances are that he will strike through the spokes, and thus be picked up by the car. More than once I have seen a snake that was supposed to be run over completely disappear. I knew a man who tried, as he thought, to run over a big rattler on a mountain road. By the time he got his car stopped, the snake had disappeared, and he supposed that it had made its escape into the dense brush bordering the road. He did not especially relish going into such cover after the fugitive. An hour later, after his family had gone into the house, and he had the car in the garage, he heard a queer noise as if some wires were crossed in the engine. He was about to investigate when the missing serpent dropped to the floor of the garage.

One of my best friends drove over a diamond-back on a sandy road one day; then he stopped the car and got out to finish off the old bell-ringer. As he stepped from the running-board, the rattler, having been picked up by the back wheel, struck savagely at him.

Perhaps the most remarkable instance of a wheel's picking up a snake—at least, the most extraordinary one that ever came to my notice personally—occurred when I was a barefoot plantation boy. My father and I were driving in an open buggy late one afternoon, when we came to a causeway. The trees that overarched it always made the place shadowy, and now that it was twilight, there was darkness there. At the head of the causeway we met an old Negro walking. As he was a favorite with us, we offered him a ride. Then across the dim causeway we drove, I being wedged in between the two men, with old Isaac on my left. As we were nearing the farther end of the high strip of road, I distinctly heard the peculiar whipping sound that is given when a bush or some like object is caught in a wheel and is threshed against something else as it is rapidly turned. Five or six times this "bush" struck old Isaac across the knees.

"Somethin' done ketch in de wheel," the negro at last said.

My father stopped the horse, when immediately we heard the diamond-back singing his shrill song of death. Fortunately the wheel had stopped in such a position that the snake was on the ground when we came to a pause. He was promptly dispatched. Old Isaac told me later that he found a patch of wet venom on his left knee, evidently spilled there when the whirling snake tried in vain to strike.

As there is some peril in driving over a rattler, there is always danger in teasing one. Such a reptile is supposed to be able to strike one-third his length; but I think such an estimate too short. Three factors have to be considered: The nature of the snake's coil before striking—that is, his stance; secondly, the vigor with which he attacks; and last and most important, the nature of the ground on which he lies. If he is striking down a slope, he may easily go his full length. I have tested this and have proved it. I lately made a four-foot rattler strike nearly five feet down a slope not sharper than one gets on a rounded highway. In fact, after his first lunge, he slid several inches, and lunged again.

While the diamond-back rattler is king of his kind, and while almost all created things go in dread of him, he has his share of enemies. Of these I should, of course, name man first, his enmity having something primordial in it. Deer kill rattlers by leaping on them, their four sets of hoofs drawn together in a cluster of rigid and fatal spears. Half-wild hogs that roam the wilderness nonchalantly kill and devour a rattler, however large. Perhaps his most interesting foe is the king snake, which pursues the rattler by scent, constricts him, and then swallows him. Forest fires destroy great numbers of snakes. They are unaffected by floods, for they are superb swimmers. In the water the rattler can be identified at a considerable distance because of his practice of holding his rattles above the surface, presumably to keep them dry and therefore properly functioning.

One day I was sitting alone in the woods, watching for wild life. Suddenly, at a little distance off to my left, there was a flash of black-and-white falling from a low, live-oak limb; then came a heavy thud, which was followed by the sound of slow scuffling. I quickly went over to this scene of encounter in the wilds, and was rewarded by a strange sight. A big king snake, which had been basking in the mellow sunlight on a horizontal limb ten feet above the ground, had dropped from that height upon a rattler. In the South this enemy of the rattler is often called the "thunderbolt," and in this case he justified such a descriptive title. When I came up to the two serpents they were locked in a fatal serpentine embrace. The king snake had the rattler by the throat, the rest of the victim's body being in the killer's powerful and inexorable toils. This combat was won by the king snake in about twenty minutes.

In pursuing the rattler the king snake is the most interesting harrier. With a lithe rocking motion, and with his head and forebody held high off the ground, he moves swiftly through the woods, threading the secret pathways with eerie assurance and with all the speed and alertness of the most crafty of hunters.

A party of us had been deer-hunting. As we gathered in the road after a drive, one of our number bore on his shoulder a long pine pole, and upon the pole a strange burden. Wrapped in final and fatal battle were a rattler and a king snake. They were of about the same proportions; the king snake was longer, but the diamond-back was bulkier. When this sinister burden was deposited in the road, we managed to separate the snakes with poles; but it was difficult to drag them apart. It was suggested that we try a race between them, and to this plan we agreed. Lifting the rattler across a roadside ditch, we gave him a quiet chance to crawl away. Indeed, we were obliged to give him the better part of a half-hour before we could be sure that he had gone any distance; for the rattler is one of the most deliberately moving of all created things. Finally we set the "thunderbolt" down on the trail of the rattler. I shall never forget with what absorbed and intelligent alacrity the king snake followed the slot. We followed the king snake; but we had some difficulty in keeping up with him. About two hundred yards from the road we came upon the combatants. Once more they were locked in grim and gorgeous battle; and as far as I could make out, though I did not investigate at too close range, they had exactly the same hold on each other as they had had when we first saw them. This second battle we did not terminate, for we knew that it would have but one ending, and that the right one. However, no king snake could ever handle one of the truly great diamond-backs.

A few years ago a school teacher in New England contended with me that there was no authentic case of death from rattlesnake venom. I wish he had been right. But any person struck by a rattler is in imminent danger of death; and every year names are added to the fatal list. There are certain factors which determine the degree of the peril; among these are the size of the snake, whether the venom is delivered into a part of the body where the blood circulates freely, and whether intelligent help is at hand. I knew a negro to be struck on the ankle by a hoary old diamond-back; but since the poison did not get fairly into the circulation, the man never even took to his bed. This same man was later struck in the calf of the leg by a very small rattler, and he nearly died. I knew a timber-cruiser to be struck on the cuff of his trousers by a rattler. The roll of the cloth

absorbed most of the poison, so that the man was but slightly injured. But this woodsman's brother was killed by a diamond-back which struck him full in the femoral artery.

The stock raiser has to meet a hazard from venomous serpents, especially if the country is wooded, affording ambush to the peril. I have lost on my plantation both cattle and sheep from snake bite; hogs are practically immune, due to their tough hides, the slowness of their subcutaneous circulation, and their truculent courage. Dogs are perhaps more often struck than other domestic creatures for they follow the snake's trail until they come to know they are trailing sudden death—when they come upon him unaware. Diamond-backs have a way of striking cows upon their udders, which is a fatal place. Perhaps the most extraordinary instance of the sudden effect of venom on stock happened on a plantation adjoining mine in South Carolina. The owner was on a rice-field bank one summer's day when he saw his herd bull jump a low fence and come strolling down the bank. The owner was just starting toward the animal to drive him out when the bull, which had been nosing the succulent grass along the edges of the bank, reared wildly, staggered, then pitched forward on his head. A great diamond-back had struck him in the right nostril, and in a half hour he was dead.

All wild and most domestic creatures detect and fear the scent of the rattler, which is heavy, oppressive, and unmistakable. The horse is especially afraid of this odor. Though man's nose has degenerated considerably, it is not hard for a person to detect the presence of a large rattler by the odor alone. However, the pungency of this is regulated largely by the humidity of the atmosphere. I was once taking a new hound out into woods that he had never visited before. Near a certain pond he began to slow up, then to drag back on the leash. At last he sat down, threw back his head, and howled lugubriously. Not until then did I remember that a diamond-back had been killed on the edge of the pond full three months before; the body had lain there, and the soil must have become impregnated with the characteristic odor, which the sagacious dog recognized.

All things considered, the rattler is a gentleman. He is never vicious except when attacked, or when he thinks he is about to be attacked. Almost invariably he gives his strange and thrilling warning before he strikes—which is more than any other venomous serpent in the world does. He spends most of his life in retirement; and if a man comes upon him, the chances are that the presence of the snake will be made known before the man is in danger.

Though I have purposely roamed the haunts of the diamond-back for forty years, I have never felt particularly apprehensive. Yet no man of sense can fail to appreciate that the rattler, while he need not be continually dreaded, is always to be highly respected. The wise man looks keenly and steps warily and listens intently in snake country.

The Marsh at Twilight

A glowing ripple, where the waters break
The purple shadows in a widening wake,
Points, like a spearhead, to a close thatched dome
Where cat-tails cluster near a muskrat's home.

A lone goose, straggler from a routed flight,
Drifts down the sky into the fading light.
From high and far the loon's wild laughter
Floats—trembling echoes quavering after.

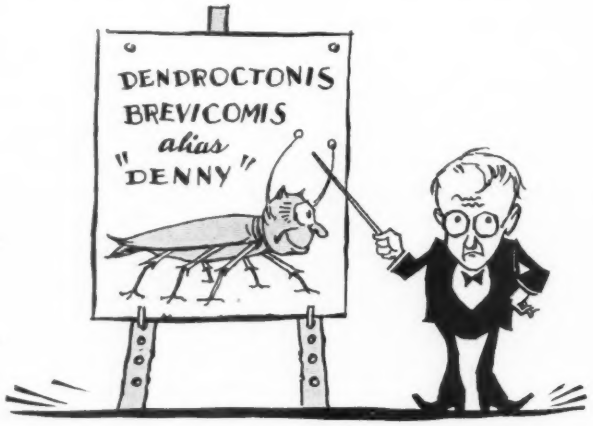
Keen little winds creep through the sedge
That weaves a carpet to the river's edge,
And break the mirror of an afternoon
To lay a silver pathway for the moon.

—John Phelps

The Quiet Season for Lumbermen

By Paul Hosmer

MANY strange thoughts surge through the noble dome of the lumberman in the course of an eight-hour day as he sits at his desk poring over the cost statements and wondering how he is going to make her pay with a three donkey show and the market gone haywire. Some there are who spend the entire eight hours worrying over the lumber business. Others spend a certain amount of time pondering on the business and put in the last couple of hours looking for a drink. Still others put in the first hour of the day trying to jazz up the lumber market and then sink into a gentle daze for the other seven. Right now, though, the pine lumberman, with no orders coming in and no business in sight, arrives at his office and reads avidly that part of the paper in which Hoover tells him how prosperous he is, after which he opens the door and admits a number of eminent scientists and logging gentlemen who wish to take up with him a matter concerning the annihilation of a certain little curse of nature known to the scientific world as *Dendroctonus Brevicomis.*



It is highly probable that you have heard of this pest without actually recognizing it, as the darned thing is called by a number of names, depending on who is doing the talking. The scientists, as stated, call it *Dendroctonus Brevicomis,* which is pretty hard to say, quite difficult to write and practically impossible to spell without a college education, so you won't hear the humbler classes calling it by its real name. The rabble, the proletariat and the bourgeoisie know it as the pine beetle, if they know it at all. The lumberman usually refers to the little devil in terms suitable to censor.

From what study we have made of the insect we are inclined to think that the lumberman's is the most comprehensive term for it, but as it cannot be written and *Dendroctonus Brevicomis* is too hard to spell, for the purpose of this article let's refer to it from now on as just plain Denny.

Denny is a bug which is very likely to find himself in a bad way if he isn't more careful. For years we didn't hear very much about him. If he had any being at all it must have been in some out-of-the-way place which the lumberjack had not invaded. He was apparently a bashful and home-loving little creature and attended to his own business and stayed on his own side of the fence. His large and healthy family was reared some place in the outlying districts where loggers and government entomologists weren't always stumbling over it and his home life was spent in peace and contentment.

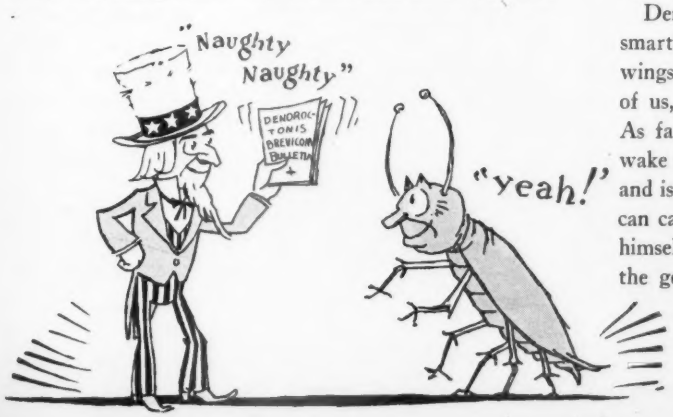
All that is changed now. For some reason which scientists have so far failed to discover, little Denny, together with his cousins and relatives, began to get chesty. Maybe he was just holding back, like a good general, waiting until he had a large army to back him up, but whatever the reason he suddenly began to make a nuisance of himself. Logging bosses, cruising about through the woods on the lookout for a good block of timber into which they could move an antique threshing machine boiler, four used horses and a second-hand Lang camp range, were continually running afoul of him. For a long time he contented himself by carrying on raids in government timber in which he was comparatively safe as the poor old government, bowed down with the demands of farmers, bankers and congressmen for different kinds of relief, and having only a few billions of gold in the coffers, was unable to spend any money to combat him. When he finally succeeded in making such a nuisance of himself that he could no longer be ignored and his depredations were beginning to cost the timber owners money, the government took a very drastic step and issued a bulletin on the subject. This bulletin was designed to warn people of Denny's pernicious activities and scare him off and would undoubtedly have done some good if Denny himself had ever learned to read. As it was the blow which the government aimed at him was practically wasted.

Denny and his cohorts ignored the government's diplomatic note and went merrily on their way, boring holes in pine trees, laying eggs, destroying timber and raising the deuce generally, but it was this arrogant attitude of his which caused him to get himself into his present trouble. Believing himself unconquerable, he became discontented with merely flying about here and there and killing off a bunch of government stuff in which there was no real kick. He let himself get just a little swell-headed and undertook to subdue a few more worlds. He set out to start a few foreign colonies of his offspring in some timber that was owned by private lumbermen on which they had been paying taxes for twenty-two years without a return and they put up a fight.

Now the lumberman is not ordinarily recognized as much of a scientist. He knows how to log and cut up trees and he knows all about selling the boards in the open market, but when it comes to understanding the habits and home life of things like Denny he isn't there. When a bug expert mentions an insect and begins to refer to its oviposter, trochanter or even a pronotum, the lumberman merely holds his head in his hands and takes another aspirin tablet. But when he suddenly was made to understand that Denny was getting into his trees, actually boring holes right through his pocketbook, as it were, it put a different light on matters. It made him mad. He even went so far as to offer to spend some money in fighting the pest if the government would tell him how to do it. He volunteered to pay part of the expenses if the government would stop writing notes and loan him its scientists and entomologists until they had knocked Denny loose from his back nippers. This was a concession, you will admit, coming from a lumberman. When a lumberman offers to spend money you know he is desperate.

Anyhow, that's the way the overconfident Denny got himself into trouble. He overreached himself and covered too much territory. The result is that he now finds himself the object of assault from several directions at once, and just as he gets moved into a good home with a nice batch of eggs all laid for the coming summer, he suddenly discovers he hasn't any more home than a Chinese president. The lumberman, guided by the government entomologists, sneaks up on him while he's asleep and burns the house down. That's one thing about a entomologist. He always gets his beetle.

Denny's life cycle is something of a mystery today even to the all-seeing entomologist. While they have studied him to the best of their ability and opportunities, there are several things about the little nuisance which they don't understand. For instance, they know that the beetle hatches a new brood twice a year and that at a certain time they all get up and fly away to other trees. They know that the female goes to the new tree first. Why she does so is something the scientists have not been able to figure out. All they know is that pretty soon along comes the old man and all of a sudden—



blooey. Mamma's got eight hundred new children that somebody's got to look out for.

Scientists have been unable to determine whether little Denny is polygamous or not. The worst of it is it's a hard thing for even an entomologist to find out about. Insects and bugs of all kinds are more or less secretive about those things, which is no more than right. Even a bug is entitled to some kind of privacy. All of them seem to demand privacy in their home life and you never see them out any place in public except at picnics. Some bugs can have children by just sitting down and thinking about it. Others simply seem to get the idea that the family is too small and something ought to be done. There's a trick to it some place, but entomologists have been unable to discover it.

The lumbermen, however, assisted by the government scientists, are putting up a determined resistance to the onslaughts of Denny and his little playmates. Organized troops are in the field, well armed and looking for battle. Scouts go out ahead and locate Denny's strongholds. They wait until the family is bedded down for the winter, the supplies laid in and all the guards asleep at the post. Then the attackers, sneaking quietly through the brush like a marauding band of Piutes, surround the tree in which little Denny and a couple of million relatives are resting so easily, and saw it down. Before Denny can wake up the women and children and get them out of the place, the raiders have stripped the bark from the fallen tree and set fire to his home.

Denny and his brothers and sisters are able to move right smartly about the countryside when they have their new wings and feel in the mood for it, but they are, like the rest of us, not so sprightly when roused out of a sound sleep. As far as that goes, it doesn't do any good for Denny to wake up anyway. He hasn't any wings at that time of year and is forced to move so slow that even the government men can catch him. And right there is where Denny oversteps himself. He fails to realize that while he has the numbers, the government men have the brains, and that's what it takes to win battles nowadays. The government entomologists are smart and they do their fighting while Denny is asleep. That's strategy.

As soon as one tree is (*Continuing on page* 739)

Forest People

A Pine-Tree Farmer

By K. S. Trowbridge

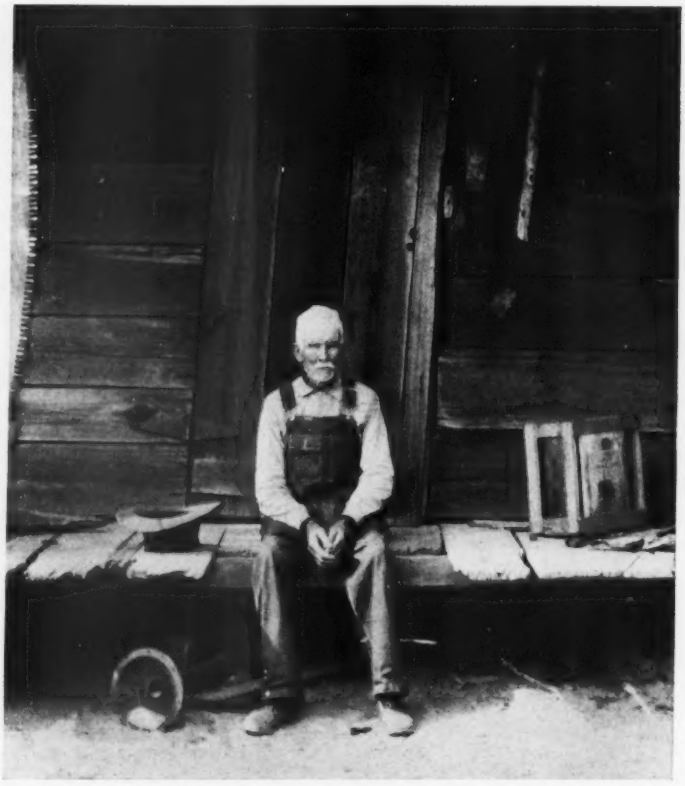
The seedlings really made astounding growth.

JUDGING by years alone, Uncle John Davis of Treutlen County, Georgia, is getting well along in life. He is better than eighty years old. But when it comes to ability to do a full day's work he has the younger generation put to shame. Uncle John is a "pine-tree farmer," only recently converted but is out to make up for lost time.

Several years ago James Fowler of Soperton, Georgia, began to plant slash pine on his run-down farmlands. Uncle John heard of this, and knowing Fowler intimately, had a big laugh. "Jimmy sure is crazy to fool with them things," he chuckled. "He will be dead and buried before they are large enough to make switches."

Uncle John thought he had a great joke on his friend. But he was an observant old fellow and watched the planted pines. In three years he was astounded at the growth the seedlings had made. It was apparent that the people in his section of the country had been passing up a very good proposition. He went home and took stock of his uncultivated land and noticed, with a great deal of satisfaction that he possessed very good stands of natural reproduction.

Uncle John had heard of the efforts that were being made by many farsighted men to keep fire out of their woods, and he had been told that the growth rate of pine would double under fire protection. He then resolved, as he put it, to go into the "forestry business."



"Uncle John"—an eighty-year-old convert to pine-tree farming.

However, let Uncle John tell his own story. With Mr. Fowler I called on him one day this summer, and he was proud to show us his "saplin's," as he called them.

"I didn't know nothin' about trimmin' and thinnin' pine trees," Uncle John will tell you. "Jimmy Fowler got me started. But when I did start I plumb wore out an ax and almost wore myself out too. I trimmed up eighty-five acres this past winter, and I didn't stop at that. I plowed fire-lines around all of these here patches of trees, although I didn't quite get them wide enough. That confounded neighbor what lives over the other side of me set fire to his woods to green-up his grass and let it get in my trees. It about

burned up that patch of pines. Now you recollect, Jimmy, that patch over there," he went on, addressing Mr. Fowler. "they were too thick, and I told you if you was to commit a crime that would be the best place in Treutlen County to hide. Well I thinned them out. There are so many little saplin' stumps in that patch now that if you was to go through you would have to walk like a hound dog in high rye. Ain't them trees pretty? Lord, they shore is growin'."

"Uncle John, you used to burn your woods, didn't you?" I asked after a slight hesitation.

"I shore did, son," he replied immediately. "I wanted everything on my plantation burned off every year. Everybody always burned their lands. My daddy always burned, and I thought it was the thing to do. But I soon saw that my cows got along better when the land was not burned. I learned from experience, not to burn the land. So this forestry business works two ways—it keeps my cows up better and my trees grow faster.

"See that patch of pines there? That is where I hauled my stumps fourteen years ago when I cleared out a field. The pines came right up and in a couple of years they will be big enough to turpentine. They shore didn't cost anything to raise. I am runnin' three plows on my farm now, but I wish I had more saplings and was runnin' two plows."

For a moment there was a pause, then Uncle John turned upon Mr. Fowler with a mild twinkle in his eyes. "There is one thing about this forestry business that I ain't so fond of. When I work in the sapling stumps I have to wear shoes. I can plow all day long if I go barefooted, but when I wear shoes I tucker out before the mornin' is over."

It was nearly midday when we had called on Uncle John and a good hot sun was beating down. Yet in spite of his eighty-five years, he had about walked us down. He was good for the rest of the day but we felt that we could see more of his trees at some later date when the weather was not so hot. As we started back to the car, however, Uncle John insisted that we make a slight detour and see his bee tree. He showed us where a swarm of bees had made their home on a limb in the top of a slash pine and had produced honeycomb.

In one of Uncle John's "patches of saplin's" in Treutlen County, Georgia—he is telling the author how he thinned and limbed up the trees to help them grow.

"I have been living quite a while but this is the first time I have seen bees swarm and make honeycomb on the branch of a pine tree," the old planter told us.

We agreed with him, for it was a new one on us also.

They say that "you can't teach old dogs new tricks." We know better, for Uncle John is the most enthusiastic forestry farmer in Georgia. It takes enthusiasm at his age to accomplish what he has in handling young timber.

An Adventure in East Siberia

By Boris d'Adamovitch

The great Siberian wilderness, one of the really mysterious lands of the world, not only holds in its vast forests the fierce Siberian tiger but a far more dangerous game—one that has claimed the lives of many men. Boris d'Adamovitch, a forester and gamekeeper at Fitzwilliam Depot, New Hampshire, who relates this strange adventure, was formerly a Colonel of Imperial Russian Cavalry.—EDITOR.

AS this is my own experience, I am able to vouch for its authenticity. In January, 1917, I left the hospital while convalescing from my fifth wound. I had been commissioned to take charge of the Cavalry Depots in Eastern Siberia and of the 1st Irkutsk Cossack Regiment. The sight of my right eye had just been recovered and I was interested to find out whether it would be as accurate in shooting a rifle as it had been before. I was fortunate enough to receive a month's leave, and started at once for the hunting regions east of Irkutsk. My ordnance sergeant, Shalashkov, accompanied me.

Very soon we were in the deep Siberian wilderness, north of the Amur and Shilkra Rivers. We located in a small cabin in the deep woods, hundreds of miles from other human habitations. Since we were war-weary from three years' service on the Eastern Front, we were able to enjoy completely the solitude, the closeness to nature, and hunting.

For the first two weeks all went well, and we experienced only the usual hunting adventures. One of our dogs was caught in a rabbit snare—a young birch bowed down, with a snare attached. The poor dog was suspended in mid-air, and we arrived just in time to save his life. The trap had been set by Chinese from across the border. Some days later we found, in a game pass, an interesting tangle of wires. Solving this puzzle with great care, we found it was a gun-trap, set with an old muzzle-loader crammed with scrap-iron and nails. It was arranged to fire upon any creature which might disturb one of the wires. Again we suspected the Chinese.

The bag of two weeks' hunting was two bears, one moose, seven deer, countless rabbits, five foxes, and two wolves. The wolves were shot from the cabin window at night. Black cocks and woodhens without number hung in several bags. We hoped continually to get one of the big Siberian tigers, which come from the Amur region, and to cover more country we separated, during the third week, and made our daily trips alone and in opposite directions.

On one clear, cold day of this week I was tramping along a chain of hills, on the lookout for tiger tracks, when I saw a number of deer in the valley below me. I debated whether or not to shoot, for we had enough deer, and I was ten miles from the cabin. It is no small job to pack a deer ten miles through the wilderness.

Just as this was running through my mind I saw the deer suddenly dash down the valley. I was much interested to know what had startled them, for I was quiet and down wind. It was a large valley, covered with bushes, young spruce, and older forest growth. I decided to investigate the reason for the flight of the deer, and started down into the valley. As soon as I was on the lower level, making my way through the underbrush, a bullet whistled by my ear. Instantly there was the crack of a rifle.

My first thought was that Sergeant Shalashkov had changed his direction and mistaken me for game. Just then I heard a second report, and this bullet struck a branch near my cap. Instantly I dropped to the snow, drew off my fur coat, cap, and long boots, and with these made a dummy in the snow. Then I crawled snakewise to the nearest spruce, taking cover to be ready for action.

After a wait of about fifteen minutes, a muffled sound came from my left, and soon another noise from my right. This meant there were two men hunting me. My gun had three barrels—two shot barrels and a rifle barrel. Also I had a large hunting knife.

Soon the noise came nearer, and I saw on my left a Chinese with his rifle ready approaching my dummy on the snow. A moment later, from the right, came a second Chinese. The first man stopped and fired at my dummy body. Just as he did so I sent my bullet into the other man and then a load of shot into the first man. Both went down.

I reloaded and carefully approached the men who had wanted my life. The Chinese on my right had died instantly; the bullet had pierced his heart and shattered his spine. The second man died as I was examining him. I gave an alarm with my hunting horn and soon Sergeant Shalashkov arrived. We searched the bodies and found a lot of money, cartridges, passports, and leather bags of gold-dust.

Chinese bandits are called "hounhous" and they come over the frontier to hunt gold prospectors and hunters, whom they kill for their gold-dust and fire-arms.

In the true wilderness the most dangerous creature to meet is the human, for he is the cruelest and fiercest of animals. Thus an outdoor man in the Siberian wilderness must always be alert to protect his life and those of his companions.

On this trip we did not bag a Siberian tiger, but we felt satisfied to have killed two tigers of a more dangerous sort. The loot we took from the bodies of these men was sent to the police to be distributed to the families of prospectors who had been murdered by the Chinese.

School Prize Awards

Lesson Plans Outlining Use of "American Forests and Forest Life" in Schools Selected

MISS HELEN M. DAVIDSON, a teacher of social science, Peabody High School, Pittsburgh, Pennsylvania, has been awarded the prize of $50 in the contest conducted by The American Forestry Association for the best suggestion embodying a detailed lesson plan and outlining how AMERICAN FORESTS AND FOREST LIFE can best be used in the schools. E. M. Dahlberg, a teacher of biology, Ladysmith High School, Ladysmith, Wisconsin, was awarded the second prize of $25.

Miss Helen M. Davidson, whose lesson plan was awarded first prize in the Association's School Contest.

In presenting her outline plan to "bring about an understanding of why a program of forest conservation has become necessary when our original policy was one of wastefulness," Miss Davidson begins with the early Colonial forests and the attitude of England toward their use. After locating and characterizing these forests, she brings out the reservation of certain forest tracts for England's Royal Navy, the shipbuilding activities of the early settlers and the waste in harvesting the naval stores crop.

The American Indian and his relation to the forests come into the lesson plan at this juncture. Then westward with the American frontier, delving into the methods of acquiring the Public Domain and asking why the Government did not take steps to prevent forest destruction. Finally, the withdrawal of certain forested public lands and the creation of the National Forest System.

She looks into wastefulness in cutting timber, destruction by forest fires, insects and diseases, the weakening of trees due to tapping for naval stores, excessive taxation and failure to reforest. Then comes the rapid disappearance of the virgin forest, the progress, step by step, toward restoration, and the development of utilization, wood preservation and other phases of forestry and the forest industries. Finally, she leads to the present controversy of turning over to certain states portions of the Public Domain.

Miss Davidson, a graduate of Vassar College, has observed teaching methods in many parts of the world, having at one time instructed in the Constantinople College for Women in Turkey. During the World War she served with the Y. M. C. A. in France.

"Since the time of Roosevelt," she says, "the American people have come to have a vital interest in the conservation of our natural resources. Such rapid progress has been made in recent years that it has become impossible for textbooks to supply the necessary material for the requirements of the schoolroom. Interest must, therefore, be aroused by consulting the current literature of the day, and where could a more valuable source of information be found than in AMERICAN FORESTS AND FOREST LIFE, the official magazine of The American Forestry Association?

E. M. Dahlberg, whose plan to use American Forests and Forest Life in the Schools, won second prize.

"What an opportunity the magazine affords the child to whom mere words fail to convey any impression of our great American forests to spend a class study period merely looking at the pictures of forests, flowers and animal life! What thoughts would not stir their imagination as they recalled these pictures, and what longings would not be aroused to spend their vacation in such beauty spots. AMERICAN FORESTS AND FOREST LIFE is arousing in our American youth a desire for the right kind of leisure and thought which brings with it a real recreation for health in the great out-of-doors.

"Another great value of the magazine in the classroom is to make for better citizenship, for, while arousing a love for

the forests, it stimulates a desire to take an active part in the creating and preserving of forests for future generations. And what an abundance of supplementary material for the enrichment of the child's mind! Surely, no American boy or girl who has learned the value of AMERICAN FORESTS AND FOREST LIFE can read with indifference an account of a forest fire. They will see the necessity for government, state and individual action in protecting and restoring the forests."

Mr. Dahlberg's lesson plan calls for outside reading of AMERICAN FORESTS AND FOREST LIFE to be reported in the classroom, and a class study period. During the fall school period, study is devoted to insects, birds and mammals. In the spring the student goes into the woods and fields. AMERICAN FORESTS AND FOREST LIFE is most valuable on these excursions, says Mr. Dahlberg. The subjects chiefly considered are forest fires, historic trees, National Forests and Parks, the farm woodlot, utilization of wood waste, and the enemies of the forests—insects and fungi.

Mr. Dahlberg, in addition to directing the science department of the Ladysmith Public Schools, is a member of the Wisconsin Conservation Commission and president of the Dahlberg Nurseries, at Ladysmith.

Outline lesson plans receiving honorable mention were submitted by Miss Grace Bagby, Flint Central High School, Flint, Michigan; Miss Henrietta Schmeuszer, College Hill Public Schools, Cincinnati, Ohio; and Miss Lela B. Kennedy, Junior High School, Dothan, Alabama.

Picturesque Career of Charles F. Ruggles Ends

CHARLES F. RUGGLES, of Manistee, Michigan, known as "the last of the lumber barons," died late in August, at the age of eighty-four, marking the passing of perhaps the most picturesque career in the romantic history of the American timber industry.

Although a multi-millionaire, with large holdings in many sections of the country, particularly the Lake States and the Pacific Northwest, he lived alone in small quarters over his office in Manistee. He never married, prepared his own meals, wore moccasins habitually, and worked up all the timber estimates on his extensive holdings. He made candy in great quantities and distributed it to children. Though living in this manner, the old lumberman took an active and intelligent interest in the affairs of the world, contributing liberally to many organizations and societies.

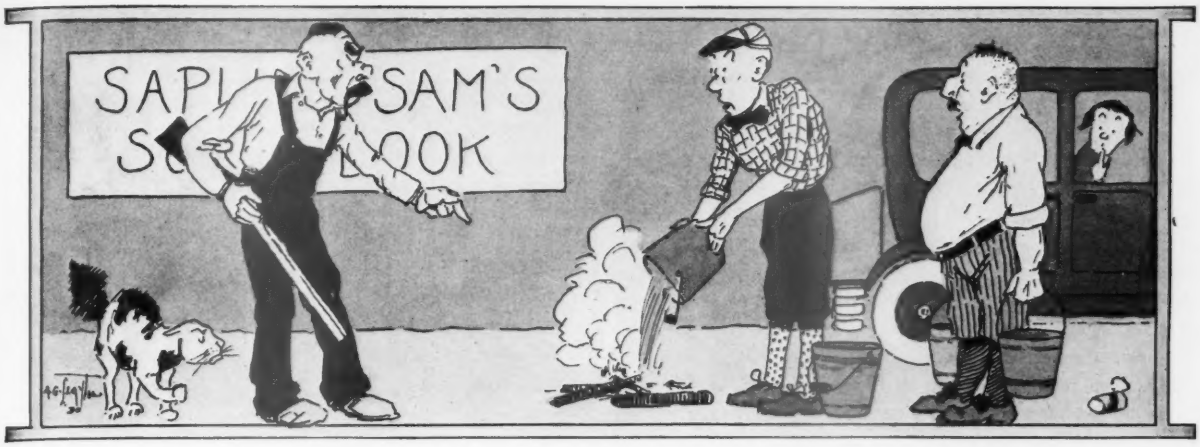
Penurious, grasping, untidy, he was admired and loved almost beyond measure by his friends and associates for his human instincts, his uncanny common sense, his business judgment and his ability to organize and build.

Once in San Francisco the quaint lumberman tried vainly to see the owner of a large tract of sugar pine he wanted to purchase. The owner's secretary would not believe the unkempt old man was responsible. Finally Mr. Ruggles had the secretary call his New York banker who identified him and gave the bewildered secretary the information that the little old man in moccasins could doubtless raise $10,000,000 without effort. Mr. Ruggles got the sugar pine.

CHARLES F. RUGGLES

In a little South Carolina town he stopped at a small cafe to get coffee and doughnuts. When presented with a bill for fifteen cents, the old lumberman refused to pay it, maintaining that coffee and doughnuts were not worth more than ten cents. When the waiter persisted, however, he paid his bill, stoutly declaring that the people should have coffee and doughnuts for ten cents. As a result he set the waiter up in business—selling coffee and doughnuts for ten cents.

Later he hired a farmer to drive him from his woods camp to town, and when the farmer charged him five dollars he refused to pay, declaring the trip worth only four dollars. The farmer pointed out that recent floods had ruined his little valley farm. Mr. Ruggles would pay no more than four dollars. But several days later he gave the farmer a check for a good amount to rehabilitate the little farm.



Old Sol Has a Fling

The sun may be a billion years old, says the *Arkansas Gazette*, but this year it's been acting like flaming youth.

Note to Hunters

Suggestions are given the amateur hunter by the *Detroit News*, which points out that "if it doesn't wear a vest, a necktie, a mustache, or a hat, and doesn't smoke a pipe, it is probably a cow."

Taking the Cure

She was visiting the Zoo and gathering as much information about the animals as possible in one short afternoon.

Eventually she came to the bears.

"Are those animals carnivorous?" she asked the keeper.

He scratched his head and then smiled brightly.

"They was, ma'am," he answered. "But they're all right since we washed 'em in carbolic."—*Kablegram.*

Even As You and I

"Don't worry, there are plenty of good fish in this lake."

"Yes, an' I'm the guy that left them there."—*Arizona Kitty-Kat.*

All some hunters ever have is a bag in their trousers.—*Knickerbocker Press.*

Ours Doesn't Work Either!

During this dry spell, says *Judge*, forest rangers are trying to get campers to carry cigarette lighters instead of matches.

That Early Bird Again

A Yale professor has found a 100-foot worm. The early bird that gets that worm probably won't be able to get up at all the next morning.—*Troy Times.*

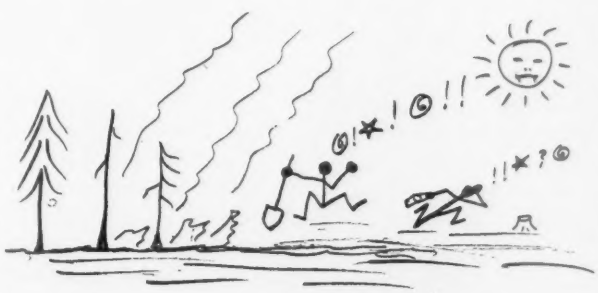
A German scientist converts wood into food. Now "Board and Rooms" can be taken literally.—*South Bend Tribune.*

'Ats Whar I Take My Next Vacation

Have you ever heard of the land of Yawn
On the banks of the River Slow,
Where blossoms the Wait-a-While flower fair,
And the Some-time-or-Other scents the air,
And the soft Go-Easies grow?

It lies in the Valley of What's-the-Use
In the Province of Let-'er-Slide;
That Tired-feeling is native there;
It's the home of the listless I-don't-Care,
Where the Put-it-Offs abide.

—*The Forest Log.*



Accounts for All the Blank Pages

"Been looking over the new 'Glossary of Terms Used in Fire Control' put out by the Forest Service," says Sapling Sam. "Sure is shy of a lot o' terms I've heard. But then I guess they'd calmed down a bit when they wrote it. Maybe they'd be called 'remarks' instead of 'terms' anyway."

His Domain!

"Who is really the boss in your house?" inquired the friend.

"Well, of course, Maggie assumes command of the children, the servants, the dog, the cat, and the canary. But I can say pretty much what I please to the goldfish."—*Montreal Star.*

Perhaps It's His Aim!

The suspicious part, comments the *Pottsville Journal*, is that the amateur hunter who mistakes a guide for a deer usually hits him.

Compromise

Boss: "Would you rather a lion ate you or a gorilla?

Sambo: "I'd sooner he ate de gorilla, boss."—*The Christian Evangelist.*

First Aid Call

Mrs. Nurich (on phone): Hullo, hullo—is this Dr. Woodhead, the tree surgeon?

Voice: Yes, madam.

Mrs. Nurich: Hurry right over. That big oak has blown down and broken several of its prettiest limbs. Do hurry.

Voice: Very well, madam, I'll be right over.

Mrs. Nurich: Is there anything I can do till you arrive?

Voice: Just keep the patient quiet, madam.

Mrs. Nurich: Anything else?

Voice: Yes, be sure you have some hot water to sterilize my instruments.

Mrs. Nurich: How about bandages?

Voice: I'll bring those.

Mrs. Nurich: And a nurse to administer the anaesthetic?

Voice: Of course. Now, madam, just keep calm and it will soon be—

Mrs. Nurich: I'll try to Doctor. But please hurry. And say—

Voice: Yes, madam.

Mrs. Nurich: I almost forgot. Better bring old Doctor Brown with you. My husband is under the tree.—*Asia Kagowan in Life.*

What the Drought Has Done to Trees

(*Continued from page* 680)

dividual cases the location of a tree, its root system, the character of the soil in which it grows, or some other local factor may have intensified drought effects. One is often at a loss to diagnose these individual cases. A tree growing on a high, dry ridge, for example, appears unaffected by the drought, while one in a normally moist location is apparently drought-sick. In the latter case it may be that the tree having developed in the lap of luxury, so far as moisture is concerned, has not had to exert itself to develop a large, deep root system and that the lowering of the water table by prolonged drought cut off its water supply. Or again, it may be that the tree is suffering from an old injury. Speaking of injuries, it is not out of reason to say that many trees have been handicapped in their struggle for life this summer by the forest fires with which they have had to contend in previous years. Fire injuries about the base of the trees have left them weakened and less able to resist any unusual strain such as drought. Furthermore, the very soil itself is less able to hold moisture, for fires destroy the mulch of woods litter. When the mulch remains intact it may serve as a blanket to hold water against evaporation. In many cases fires have eaten into the soil, destroying vegetable matter, and humus, whose water-holding power is an ally of the trees. Every year 40,000,000 to 50,000,000 acres of forest land are burned over in the United States and times like those we have recently passed through serve to drive home the insidious and lasting effects of forest fires, however light they may be, upon the nation's tree life.

Along with the drought, trees have had to reckon with insects. "It should not be assumed," says Mr. Coover, "that all dead and dying tree foliage is directly due to drought, as a dry season of this nature is extremely favorable for the activities of various insects, including bark beetles. For example, the oak leaf miner has been responsible (in Pennsylvania) for most of the dead and dying rock oak leaves within eight feet of the ground. The oak pruner and oak and hickory bark beetle have been numerous and active this year, inflicting more damage than is ordinarily observed."

As would be expected, the degree to which different species have suffered most varies throughout the drought area, depending upon the local contributing factors and conditions. In southern Pennsylvania, where the drought struck particularly hard, the Pennsylvania Forest Research Institute at Mont Alto, after a study of drought injury to trees, found, as reported by Mr. Coover, that "hickory and white oak, despite their habit of rooting deeper than other forest trees, show considerable injury; red maple shows equally as much injury, but as it is a shallow rooter, this is to be expected. Scarlet oak apparently surpasses all the oaks in its ability to resist drought injury, followed in order by rock, red, black, white, and pin oaks.

"Black locust shows high resistance to drought. No tree of this species growing naturally in the forest showed any apparent injury from drying, though it is shallow rooted.

"Among the hickories considerable variation in drought resistance is met. Pignut hickory seems to be the most resistant, followed in order by the shellbarks and mockernut hickory; bitternut hickory is the least resistant.

"The pines, and conifers in general, show less injury than broadleaf trees, though smaller white and scrub pines have suffered damage on exposed slopes and ridges. Many ornamental arborvitæ have been seriously injured, and the spruces have suffered in exposed places. The larches, too, have been injured by the drought, though the actual damage may not be as serious as present conditions indicate, since the larches are often able to renew their foliage. The Japanese larch has suffered more than the European larch. Table mountain pine is apparently the only absolutely drought resistant tree in the forest. It showed no effects of prolonged drying.

"Less drought injury to trees has been observed on dry, sandy, stony mountain soils than on the shale hill soils and fertile agricultural areas. The only injury found on the sandy, stony mountain soils is where reflected and radiated heat has burned the foliage. The water content of clay and loam soils is always greater than that of sandy, stony mountain soils, but much of the moisture in the former is held hygroscopically by the fine soil particles and the roots are unable to extract it to replace the great loss incurred through excessive transpiration of the leaves. For example, ashes and walnuts show injury on shale hill soils, but apparently none on the sandy mountain soils."

Any attempt to measure the extent of tree damage at this time must at best be speculative, because the full effect of the drought upon tree life has not revealed itself and will not for a year at least, and perhaps several years. While the number of large trees actually dead at this time may be smaller than appearances indicate, there is no doubt that the number of trees entering the winter in a weakened condition is very much greater than shows on the surface. Favorable or adverse weather conditions during the winter or coming spring will determine the fate of great numbers of these trees. Orchardists know that a heavy fruit crop means more winter killing of their trees, due to the fact that the fruit has taken food that would otherwise have been stored up for winter and spring needs. As already pointed out, the drought has been a disrupting shock to the functional activities of tree life, and those trees that have not been able to lay by a reserve supply of food and energy to cope with adverse conditions, such as extreme cold or radical fluctuations in temperature this winter or a dry spring, may "go west" with April and May winds. Or a favorable winter with another dry summer next year may write finis upon thousands and thousands of these weakened trees by this time next fall. Foresters report that already there are evidences that the drought is aiding and abetting the work of tree insects. There is, therefore, the possibility of abnormal epidemics of tree-killing insects, stimulated by a rich harvest of trees too weak to throw off the bugs. Another way in which the drought may look out from the trees when another summer comes is in smaller leaves, less luxuriant blooms and smaller fruit and seed crops due to their meager cupboards of reserve food.

That the drought has caused a slowing down of tree growth goes almost without saying. In commercial trees and forests suitable for lumber and (*Continuing on page* 734)

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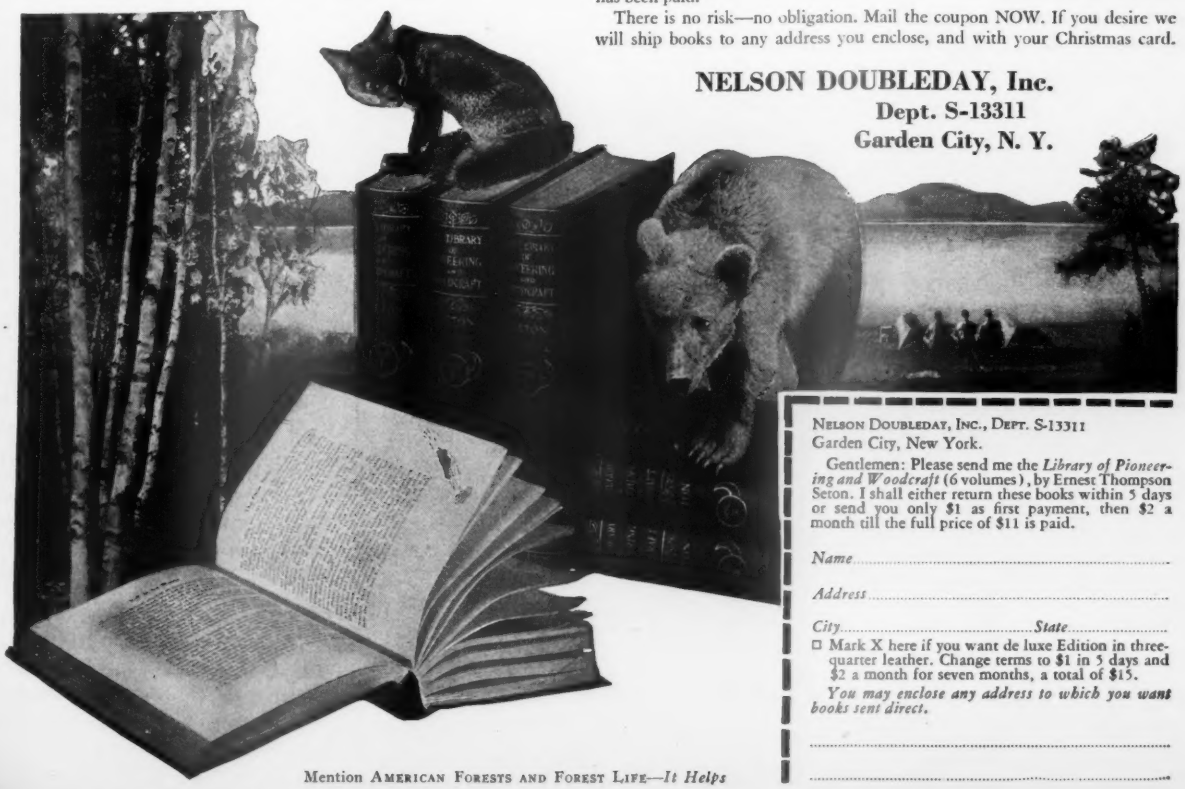

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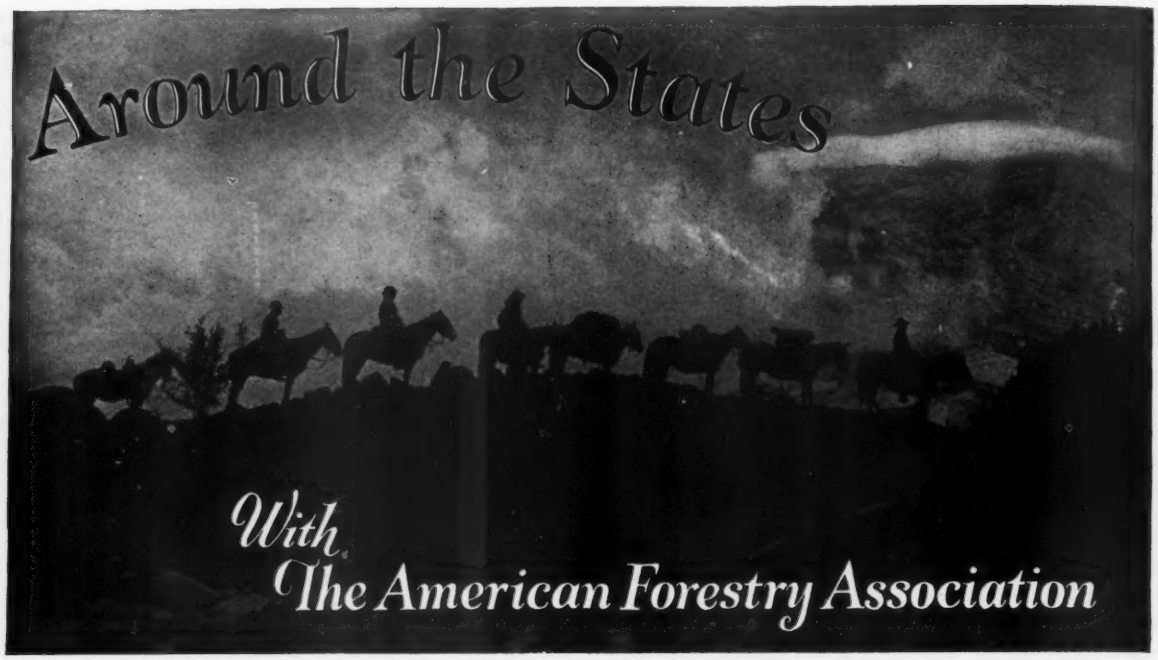
Mention AMERICAN FORESTS AND FOREST LIFE—*It Helps*



Carlos Avery Dies Suddenly

Carlos Avery, naturalist, president of the American Game Protective Association and secretary of the American Fisheries Society, died suddenly October 5 of a stroke of apoplexy at his home at Rockville Centre, Long Island, New York. It was announced shortly after Mr. Avery's death that William B. Greeley, chairman of the conservation committee of the Camp Fire Club of America, and a member of the Board of Directors of the American Game Protective Association, had been chosen to act as president of that body.

Mr. Avery was born in Illinois sixty-two years ago, but devoted much of his life to Minnesota where he was game commissioner for fourteen years. For many years he was editor of the *Hutchinson Leader*.

Identified with the American Game Protective Association as an officer since 1924, serving first as vice-president, then as seccretary-treasurer, he became president of that organization and editor of its publication in 1928.

While serving under five governors as head of the Minnesota Game and Fish Department he procured legislation for the establishment of hunting licenses and creation of game refuges —the first instance in the country of State legislation providing for establishment of game and refuges on private lands with or without consent of the owner. He secured codification of the game laws of the state and developed a law enforcement bureau of the department from a handful of wardens to an effective force. He secured the establishment of nine fish hatcheries and one game farm, during his administration. In addition to his activities in Minnesota and with the American Game Protective Association, Mr. Avery served as president of the American Fisheries Society from 1919 to 1920 and as secretary from 1924 to the time of his death. He was a member of the International Association of Game, Fish and Conservation Commissioners, and served as vice-chairman and treasurer of the National Committee on Wild Life Legislation. For years he served as a member of the Advisory Committee of the Migratory Bird Treaty Act, by appointment of the Secretary of Agriculture.

He founded the Gopher Camp Fire Club of Hutchinson, Minnesota, one of the most effective of conservation organizations. He also promoted the organization of the Minnesota State Game Protective League and 150 local sportsmen's clubs in the State.

Carlos Avery

Increase in National Park Travel

Increased travel to the National Parks during the past year has been announced by Horace M. Albright, Director of the National Park Service. This heavier use of the National Parks was the more remarkable when compared with the reduced use of transcontinental trains and of resorts generally.

For the year just ended visitors to the National Parks totaled 2,818,618, as against 2,680,597 in 1929, an increase of 138,021. Yosemite led in numbers, with 458,566 visitors.

The National Monuments as a whole suffered a loss, with 466,075 visitors, as against 567,667 in 1929. A large part of this decrease, however, was the result of the abolishment last April of the Papago Saguaro National Monument, which last year reported 87,600 visitors. The Petrified Forest National Monument in Arizona, with 105,433 visitors, led both in numbers and in point of increase. The 1929 visitors to this monument numbered 69,350.

Despite the reduction in the number of visitors to the monuments, the combined park and monument travel for 1930 is greater than that for any previous year, with the exception of 1929.

State Foresters Seek Yield Tax

Holding that upon workable forest taxation will depend largely the conservation or renewal of the forest resources of the nation, state foresters from twenty-two states, met at Portland, Oregon, early in October at the eleventh annual meeting of the Association of State Foresters.

"There is no question but the annual tax on timber must be eliminated," said State Forester C. P. Wilber, of New Jersey, president of the Association, addressing the session, "for it is a burden that eats up the timber of the country and makes a burden impossible for owners to carry. At present the tax systems are forcing cutting of timber and glutting the market, as well as destroying the timber resources. When the correct solution of the tax problem has been worked out timber production will be on an actual crop basis. Much of the marginal farm land would then be planted to forests, something that would also relieve the agricultural situation."

Other speakers included State Foresters F. W. Besley of Maryland, Frederick Dunlap of Missouri, G. R. Phillip of Oklahoma, Edmund Secrest of Ohio, Lynn F. Cronemiller of Oregon, Ben E. Bush of Idaho, and George C. Joy of Washington.

Committee on Elections Named

Mr. George Hewitt Myers of Washington, D. C., Mr. Herbert H. Smith of the United States Forest Service, and Mr. Arthur Upson of the National Lumber Manufacturers Association have been named by the Board of Directors of The American Forestry Association as the Committee on Elections for the nomination of candidates to be voted on in the 1931 election of Association officers. The election will be by letter ballot during December as provided by the By-laws. The officers to be elected are president, twenty-one vice-presidents, treasurer and four directors of whom three will be elected for terms of five years and one for a term of three years.

The directors whose terms expire this year are Mr. F. M. Besley, Mr. Frank O. Lowden and Mr. George W. Sisson, Jr. Mr. John C. Phillips has resigned from the board and his successor to serve out the remainder of his term which ends in 1933 will also be selected.

The By-laws of the Association provide that members may make nominations direct provided such nominations are signed by not less than twenty-five members of the Association. These nominations should be sent to the Committee on Elections at the main office of The American Forestry Association, 1727 K Street N. W., Washington, D. C., on or before November 1. All candidates nominated by the Committee on Elections and by the members will be published in the December number of the magazine and a letter ballot will be mailed the members on or before December 1.

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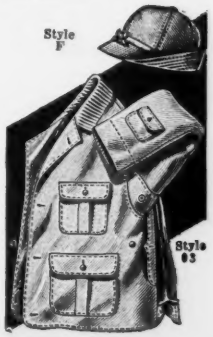

Chinese Elm

Here Are Hurry-Trees

Occasions arise which call for the fastest growth possible—a quick screen to shut out an unsightly view, something to hold a steep bank from washing out, a thousand circumstances arise every season. There are a few trees whose rate of growth is so phenomenal as to pass all other varieties—3 to 5 feet a year are quite possible. No actual figures are given for the Chinese Elm, since this growth depends on circumstances. It is, however, among the fastest of the desirable species.

Chinese Elm (Ulmus Pumila)

A new variety introduced by Dr. Wilson of the Arnold Arboretum. It has been proved hardy from Texas to Cape Cod. It can be shipped with dry roots. It thrives in dry locations. It must not be planted, however, in wet heavy land, if quick growth is desired.

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6 to 8 feet	15.00	135.00
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National Nut Trees

According to the reports received by the Council of the National Nut Tree Planting Project sponsored by The American Forestry Association with the cooperation of the United States Department of Agriculture, the Boy Scouts of America, and the American Walnut Manufacturers Association, from the Boy Scouts who have planted and are caring for them, descendants of walnut trees at Mount Vernon, Arlington, and Oyster Bay can be found in twenty-one states—Alabama, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Iowa, Kansas, Maryland, Michigan, Missouri, Nebraska, New York, North Carolina, Ohio, Pennsylvania, South Dakota, Vermont, and Virginia. They are growing in public parks, on roadsides, in Boy Scout camps, and in the grounds of private homes.

Because of the great celebration arranged by Congress for 1932 in honor of the 200th anniversary of the birth of George Washington, special plans have been made for the distribution of the nut seeds from trees at Mount Vernon. It is the intention of the Council of the National Tree Planting Project to have descendants of these trees growing in every state and to have them dedicated during the Bicentennial Celebration. These treasured seeds are being planted in nursery beds and the young trees will be sent out to committees who will assume responsibility for their planting and for dedication ceremonies. Community leaders, civic organizations, clubs—everyone is asked to cooperate with the Boy Scouts in the planting of descendants of trees known by George Washington. State capitol, university, agricultural college and teachers' college grounds are suggested as suitable places for the planting of these famous seedlings. Requests for the young trees should be made to the National Nut Tree Planting Project, 1727 K St. N. W., in Washington, D. C.

Demonstrate Planting Machine

A machine capable of planting 20,000 seedling trees a day with a crew of four men was recently demonstrated at Norwich, Connecticut. The machine, a Simplex, and tractor drawn, demonstrated unusual ability to negotiate rough ground, rocks, brush and stumps of considerable size. It set out from one-year seedlings to five-year transplants.

The machine consists of a low platform, on each side of which is a shoe shaped plow. Each plow has a vertical shank attached to it. The rear of the shank is provided with a slot into which the trees are placed, the roots entering horizontally. Ahead of the plows is a steel coulter wheel which cuts the sod and permits the shank of the plow to follow. As the machine moves the operator raises the tops of the trees so that when they are released the roots are hanging vertically in the slot, ready for planting. Tamping wheels pass on both sides of the trees as they are set in the ground. A trailing wheel provided with a commutator rings a bell at six foot intervals, guiding the operators in spacing the trees.

The machine carries on its platform pails in which nearly 6,000 three-year-old transplants can be carried at one time.

Planting at the rate of 1,223 trees an hour, 75,000 trees were recently planted in New York at an average cost of $3.36 a thousand. On good soil it is estimated that planting may be done so that not more than one percent of spaces for planting will be missed.

The Chestnut Burr

By Estelle Thomson

It was the liltingness that won him . . .
A little fairyette had spun him
A coat of brown and tan,
Rougher than any astrakan,
To wear on Sundays and on holidays
And other days . . .
And oh, how happy he—
This chestnut burr—
Up high on that old chestnut tree!
Then it was he heard a bird's voice trilling,
Right on another bough of that same tree . . .
And as the chestnut swung there, tilting—
He lost his hold . . .
And fell down, down, with many a switching sound—
To hit the ground . . .
And laid there, cold, suddenly grown old . . .
He felt his lovely coat of tan-
Green astrakan
Torn wide and flung apart—
As someone ripped his heart from that snug casket
And carried it away in a big basket!

Schumacher With Forest Service

Appointment of Francis X. Schumacher as chief of the section of forest measurements in the United States Forest Service has been announced by R. Y. Stuart, Chief Forester.

Mr. Schumacher studied forestry at the University of Michigan and served for a time with the Forest Service in Colorado. Later at the University of California he carried the study of forest mensuration to the big forests of the Pacific States.

Public Land Committee Activities

The next meeting of President Hoover's Committee on the Conservation and Administration of the Public Domain will be held at the Interior Department, Washington, D. C., November 10, according to Hugh A. Brown, executive secretary of the Committee.

During the past summer members of the Committee, Mr. Brown stated, have been in the West studying on the ground the Public Domain lands. Following the last meeting of the Committee in June, a number of members visited the Northwestern States to make a first-hand study of Public Domain problems with which they were least familiar. In September another group of Committee members made a 3,000-mile trip by automobile through the public-land states in the Southwest. This party, while in Utah, was in charge of Professor William Peterson of the Utah State Agriculture College, a member of the Committee. While in California the party was in charge of Rudolph Kuchler, president of the State Taxpayers Association and also a member of the Committee. From California the party traveled into Arizona and New Mexico, thence north into Colorado and Wyoming.

"These trips," said Mr. Brown, "are in accordance with the suggestion of Chairman Garfield at the meeting of the Committee in June."

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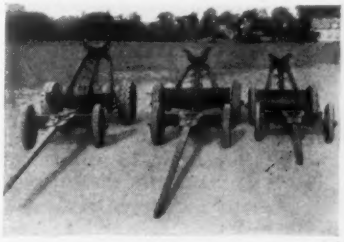

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Book News and Reviews

ARISTOCRATS OF THE TREES, by Ernest H. Wilson. Published by The Stratford Company, Boston, Massachusetts. 279 pages with 66 illustrations and a frontispiece in color. Price $15.

Well named is this book, for truly in its beautiful pages one walks with the elect, the most royal members of the society of trees, guided by the sure and experienced hand of its distinguished author, who has already made such outstanding contribution to the literature of the plant world. In this beautiful volume he introduces us to the ranking members of that society of which the poet wrote so memorably—"Only God can make a tree." Here we meet and come to know through perfect description the loveliest, as well as the most unique, commanding and important trees in the world. And they are indelibly stamped on our memory as individuals through the medium of clear and striking photographs. The author gives us, through what he himself characterizes as "the thoughts and gleanings of a life interest in trees far and near," the family histories of these royal members of the plant world, whose ancestry stretches back into eras of geological antiquity, antedating the monarchies of men. Exercising always a strong and potent influence over the peoples of the world, the ancient historic phase of tree life alone is a fascinating study, and as presented here reads like romance. Here, too, are set down delightful bits of intimate information touching the origin and distribution of species and the causes thereof. The ways of trees in orienting and firmly establishing themselves in lands foreign to their origin is full of interest.

It is predicted that "Aristocrats of the Trees" will be placed by the lover of trees reverently on the shelf in his library set apart for his most treasured and beautiful books.—*L. M. C.*

"Kiln Drying of Southern Yellow Pine Lumber," by L. V. Teesdale, Technical Bulletin No. 165, United States Department of Agriculture. Price 20 cents from the Superintendent of Documents—A detailed discussion of the drying and handling of southern yellow pine lumber.

"Our Familiar Island Trees," by Mary Dillingham Frear. Published by Richard G. Badger, Boston, Massachusetts—Without attempting to be technical, this little book describes the trees, shrubs and vines of Hawaii.

"Small Trees Wasteful to Cut for Saw Timber," by W. W. Ashe, Leaflet No. 55, U. S. Department of Agriculture—A brief statement setting forth the results of investigations showing that it cost more than twice as much in time and labor to manufacture a board foot of lumber from a tree eight inches in diameter at breast height as compared with a tree whose diameter is twenty-five inches. At the same time, less than half as much salable lumber is obtained from a cubic foot of wood in the small trees, while the lumber obtained is of inferior value as compared with larger trees.

AGRICULTURAL REFORM IN THE UNITED STATES, by John D. Black. Published by McGraw-Hill Book Company, Incorporated, New York. 511 pages. Price $4.

No doubt there are individuals whose minds are not clear regarding the meaning of export debentures, or the place that land utilization has in the agricultural development of the United States. These subjects, and many more, are included within the scope of Professor Black's timely presentation of his agricultural studies.—*G. H. C.*

FINE ANGLING FOR COARSE FISH, by Eric Parker. Published by J. B. Lippincott, Philadelphia. 352 pages; illustrated. Price $7.

Although English in sense and sentiment, and given a place in the Lonsdale Library, dedicated to that acknowledged leader of British sport, His Highness the Prince of Wales, this book is a revelation to fishermen the world over. Through chapters prepared by eminent authorities the reader becomes intimately acquainted with coarse fish and the manner of angling for them. Too, there creep into the pages many things every ardent fisherman should know, as the legal aspect of fishing, fishery management and the secrets of knots, splices, wax and varnish. It is a post graduate course for the experienced angler as well as a valuable guide to the novice.—*E. K.*

The Annual Report of the Society for the Protection of New Hampshire Forests for 1929 shows a remarkable record of achievement. During the past year 1,004 acres of forest land on Monadnock were acquired and turned over to the State. Furthermore, the Society encouraged the acquisition of 22,511 additional acres by the Federal Govern-

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ment to the White Mountain National Forest and 5,800 acres on the State Forests.

During the year the Society has employed foresters to instruct in woodcraft and forestry the boys and girls who flock to the summer camp in New Hampshire, and has encouraged the forestry activities of about 1,000 farm boys and girls who are members of the 4-H clubs.

ANIMAL AUTOBIOGRAPHIES, by Edward Huntington Williams. Published by Williams and Wilkins Co., Baltimore, Maryland. 123 pages. Price $1.

Scampering through the pages of this book are four amusing little animals whose pranks are delightfully related. The stories are not merely fabrications about the thoughts and actions of these little animals, says the author, who declares he has watched them for many years and knows that wild animals do think and express themselves in various ways almost as definitely as though they put their thoughts into words.—*P. V. G.*

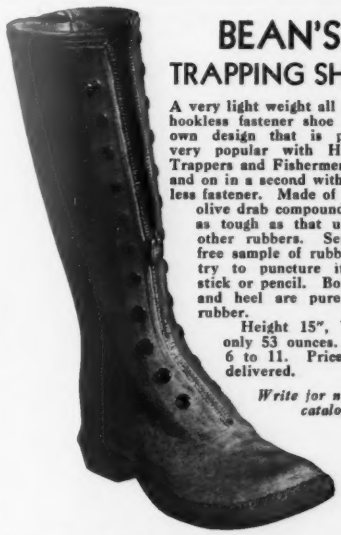
"Nature Trails in Cleveland," by Edmund Cooke. Publication No. 10 of the American Association of Museums, Washington, D. C.—A description of nature trails based largely upon those which the author has developed and maintained in the parks of Cleveland. Frequent quotations from labels help visualize the ways in which the public may be interested in nature under the guidance of a trail.

WILD FLOWERS AND STATE FLOWERS OF NORTH AMERICA, by Lydia Northrop Gilbert. Published by George Sully and Company, New York, 111 pages; illustrated. Price $1.50.

To arouse interest in preserving and protecting the wild flowers of this country the author has made this collection of wild-flower studies, accompanied with illustrations in color. It is an edition for the pocket and contains information about wild flowers that is valuable and interesting to the student naturalist.—*A. W. H.*

MY LIFE WITH WILD ANIMALS, by George F. Morse. Thomas S. Rockwell Company, Chicago. 196 pages, illustrated. Price $2.

A vivid autobiography of a man who knows the habits of animals, and who has the ability to account for them in a fascinating way. Sparkling with human interest, it is a book that should be read by both children and adults. In addition to intimate discussions on bears, monkeys, elephants, deer, moose, fox and other animals, Mr. Morse enters the bird realm.—*E. K.*



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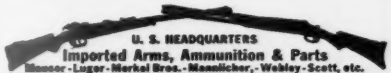

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No. 3. 20-inch wreath with five large cones and five sprays of berries. $2.50 each.

No. 4. 20-inch wreath with continuous decoration of cones and berries. More elaborate than No. 3. $3.50 each.

No. 5. A large 26-inch wreath built on frame for store or cemetery use, decorated with many cones, and berries, $7.00 each.

No. 6. Our largest wreath, 30-inches in diameter, and lavishly decorated. $10.00 each.

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These boxes contain sprays of assorted Evergreens and red Winter-berries. Also a bag of assorted cones. Just what your friends would like for decorating their homes, or church or school.

Box No. 1. Fifty assorted sprays and a bag of cones--$2.75 each

Box No. 2. One hundred assorted sprays----------$5.00

No. 3. Two hundred and fifty assorted sprays----------$10.00

Please send for our complete Christmas price list. It will interest you.

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Colorado Pulpwood Timber Awarded to International

The International Paper Company's bid of $5,500,000 has been accepted by the United States Forest Service for over one billion board feet of timber in the San Juan and Rio Grande National Forests in southwestern Colorado. This timber is to be cut principally in the form of pulpwood to be manufactured into paper, according to present plans of the successful bidder, through the Trans-Mississippi Development Company, a subsidiary of the International Paper Company, and it is expected that a new industry will be brought to Colorado as a result of the transaction.

Jadwin Named Chairman of St. Lawrence Power Board

General Edgar Jadwin, former Chief of Engineers, United States Army, will be chairman of a board of engineers for the St. Lawrence Power Development Commission, created by the New York State Legislature, it has been announced.

The Commission was authorized by the legislature and the governor to devise a comprehensive plan for development of the St. Lawrence River hydro-electric resources under state ownership.

The personnel of the engineering board was announced as follows:

Lieutenant General Edgar Jadwin, Washington, D. C., chairman; William H. Woodward, New York, general consulting engineer, formerly associated with the United States Board of Engineers on Deep Waterways; O. G. Thurlow, Birmingham, Alabama, vice-president in charge of the southern division, Allied Engineers; Colonel Frederick Stuart Greene, Albany, superintendent, Department of Public Works of New York.

Pennsylvania Forest Watersheds Defeat Drought

A survey by the Pennsylvania Department of Forests and Waters recently made to determine the effect of forests in relation to stream flow, reveals the fact that practically all the towns and cities of Pennsylvania that had well-forested watersheds suffered comparatively little from water shortage during the recent drought. More than a quarter million people and many industries depend upon the State Forests for their water supplies.

At the present time sixteen percent of the forest area of the Susquehanna River watershed, fifteen percent of the Juniata River watershed, and twenty-five percent of the West Branch of the Susquehanna River watershed are embraced within the State Forests. Special efforts are being made by the Department of Forests and Waters to safeguard and increase the water supplies.

By maintaining a good forest cover not only is rainfall conserved and erosion prevented, but also better regulated flow of streams is secured.

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Revenue of National Forests Shows Increase

Showing a gain of more than seven percent over the preceding year, the receipts of the country's 149 National Forests totaled $6,751,553 for the fiscal year ended June 30, it has been announced by the Forest Service.

The major portion of the year's receipts came from timber sales, grazing permits, and special uses such as rentals of summer homes and resort sites. Although the bulk of the receipts came from National Forests in the Western States, the largest comparative gains were made in the Eastern and Lake States Regions. Of the total revenue, twenty-five percent will be allotted to the states within whose borders the National Forests lie. These allotments are paid to the states each year to be prorated among the counties in lieu of local taxes, and become part of their school and road funds. The Federal Government also sets aside ten percent of the total receipts to be added to the regular appropriations for road building in the National Forests.

Although sales of National Forest timber increased as a whole last year, revenue in the timber-growing states of Washington and Oregon dropped by $322,047, owing to light demand for timber, and this region yielded first place in sales to the California Region. Receipts in the National Forests of the California Region, which includes small areas in Oregon and Nevada, amounted to $1,637,340, showing a fifteen percent gain, as against receipts of $1,371,596, a nineteen percent loss, in the North Pacific Region.

The receipts and percentages for other regions follow:

Northern Region, comprising Montana, northern Idaho, and North Dakota, $718,816, a gain of nine percent; Rocky Mountain Region, covering Colorado, eastern Wyoming, Oklahoma, Kansas, Nebraska, and South Dakota, $1,029,137, a gain of nearly fourteen percent; Southwestern Region; Arizona, and New Mexico, $547,631, a decrease of one-fifth of one percent; Intermountain Region, Utah, southern Idaho, western Wyoming, and Nevada, $744,602, a gain of thirteen percent; Eastern Region, comprising the Southern and Eastern States, $535,380, a gain of approximately seventy-eight percent; Alaska Region, $110,307, a gain of over thirty-three percent; and the Lake States Region, including Minnesota, Michigan, and Wisconsin, $56,740, a gain of sixty-one percent.

The net increase for the year in all forests amounted to $451,751. The total National Forest receipts for the year came from the following sources: Timber sales, $4,337,543; timber settlement, $28,036; timber trespass, $12,724; turpentine sales, $11,588; grazing (cattle and horses) $992,304; grazing (sheep and goats) $931,649; grazing trespass, $18,960; special use, $300,257; occupancy trespass, $302; water power, $107,492; fire trespass, $10,693.

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What Drought Has Done to Trees

(*Continued from page* 724)

other wood products, this is a money loss or damage that for the drought area as a whole will run into real figures. This may be more readily appreciated by visualizing a forest of a thousand acres in which under normal conditions the trees are annually adding wood at the rate of one hundred board feet an acre, or one hundred thousand feet, for the entire tract. A reduction in the year's growth of 50 per cent means a crop loss to the owner of fifty thousand feet of wood marketable in the future. Just as with fruit trees, the owners of forest trees are getting a reduced crop this year. Trees normally put on the greatest growth during the spring and considering the dry spring preceding the summer's drought, it is not unlikely that in many sections forest owners have lost much more than fifty percent of a normal wood crop.

One cannot reckon with droughts and trees without reckoning with forest fires. And here is another page of red figures for the trees. In most of the dry states forest agencies have had to cope with abnormally serious fires in fields and forest. Reports from these states indicate twice the number of forest fires in 1930 over 1929. In Maryland, for example, the State Forester reported for the first eight months of 1930 a total of 1,308 fires, with 62,000 acres burned over, and an estimated damage of almost half a million dollars. The previous most serious fire season in this state was in 1926, when 515 fires were recorded. It is interesting to know that of the 1,308 fires in Maryland in 1930, smokers caused 443, leading by a wide margin all other causes.

The question naturally arises if first aid can be rendered drought-sick trees. With forests, treatment of individual trees is costly and usually impracticable because of the numbers involved, but street, shade, and ornamental trees generally can be given individual attention without too great a cost. These trees frequently suffer even more than those in the open, in spite of the greater opportunity of the owner to extend relief. Most important of all, trees suffering from the drought this fall should be kept well supplied with water, particularly if there is a shortage of rainfall. This does not mean a superficial sprinkling but a real soaking that will get the water down to the roots of the tree. If extreme dryness continues throughout the fall and winter, the tree should be given a feeding of easily assimilated nitrogenous fertilizer next spring when growth begins to stir. The fertilizer should be well worked into the soil from the base of the tree to the spread of the crown. There are numerous shrub and tree fertilizers on the market with instructions as to their use. Bone meal is always good. Beyond what has been indicated, one must pretty much trust his tree to Mother Nature for a kind winter and a favorable spring and summer next year.

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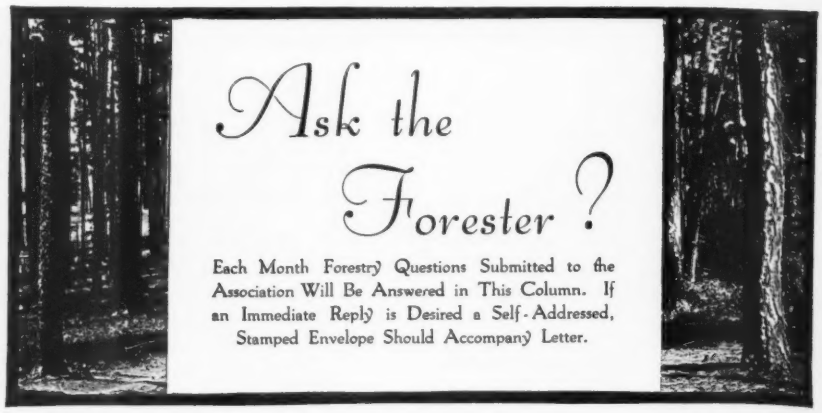

Ask the Forester?

Each Month Forestry Questions Submitted to the Association Will Be Answered in This Column. If an Immediate Reply is Desired a Self-Addressed, Stamped Envelope Should Accompany Letter.

QUESTION: Having in mind the qualities of symmetry, cleanliness, immunity from insects and diseases, abundance of shade, hardiness under city conditions, and type of root systems, what trees would you recommend for planting in some of the street curb lawns?—*C. A. C., Ohio.*

ANSWER: Sugar maple, American elm, red oak, black walnut, white oak, pin oak, red gum, Norway maple, and ginko can be recommended for your region. One needs to limit the planting of ginko to the staminate specimens. The pistillate individuals develop fruit which is slippery underfoot and malodorous.

QUESTION: What is the value of sweet gum stumpage in Virginia?—*P. B., Idaho.*

ANSWER: According to the Untied States Forest Service, sweet gum stumpage in Virginia sold during 1928 for $3.26 a thousand board feet. The range was from $1 to $5 per M. Only one sale of sweet gum logs was recorded in the Forest Service files for 1928 and the price was $28 per M.

QUESTION: Would young sugar pine, growing at elevations of 2,000 to 3,500 feet above sea-level, be benefited by having a space cleared around them?—*N. L., Jr., California.*

ANSWER: In general young sugar-pine seedlings growing beneath a stand of larger trees or brush would benefit by having the surrounding material cleared away. It need be cleared only enough to free the top of the trees. Too heavy clearing will expose the trees to the sun and weather and cause them to dry out.

QUESTION: We have planted a few hundred sugar-pine seeds, and now have about a hundred seedlings six to eight inches high. Should they be transplanted to deep forest or heavy sunlight?—*N. L., Jr., California.*

ANSWER: They are large enough to be transplanted to a permanent location. This can be done during the dormant season, preferably just before or during the early part of a warm, rainy season when growth may be expected. Transplant the sugar-pine seedlings in open places rather than into the deep forest. There are enough trees in the forest already and reproduction will be taken care of naturally. Planting need only be done on open land where natural reproduction will be slow or especially difficult.

QUESTION: Is the area of timber land in New Hampshire increasing or decreasing?

ANSWER: In 1850 there were about 2,500,000 acres of cleared land in New Hampshire, all of which was in pasture and farm land. Recent figures show that less than 1,500,000 acres are cleared and under cultivation. The other million acres that was cleared in 1850 is now covered with tree growth, some of which is fairly good.

QUESTION: Can Eucalyptus trees be grown in coastal South Carolina? If so, what commercial value would they have?—*J. D. M., Jr., South Carolina.*

ANSWER: No doubt eucalyptus can be grown in this region. There are about three hundred species of this tree, all native of Australia and New Zealand. Most of them are tropical and subtropical in nature, but a few will stand rather low temperatures. They range from small, desert-like shrubs to forest giants of great commercial value. About seventy species have been planted in California, and some have thoroughly adapted themselves to that region. Most common of all these is blue gum (*E. globulus*).

It is doubtful if eucalyptus grown in South Carolina will be of any commercial value. The trees are beautiful additions to the landscape and in many regions are admirable shade trees, but have not given the financial yields that were expected. The wood is hard, fairly durable but for the most part is difficult to handle in the form of lumber. Some species make desirable post and piling, and eucalyptus charcoal is of good quality. The difficulties of seasoning the lumber are so great that trees less than fifty to seventy-five years old have little commercial value. High-grade eucalyptus lumber from Australia comes from trees over one hundred years of age.

Galagina, the Gobbler

(*Continued from page 682*)

turkey eggs. The removal of wildcats, raccoons and foxes undoubtedly helps the turkey flocks, but they are only saved from these to fall prey to the sportsman.

Yet the sportsman himself has done a great deal to preserve the turkey. Every nature lover must have rejoiced to see the day when the law stepped in and forbade any shooting of turkeys from a blind and the taking of them in traps. In entering the latter as freely as they did, the turkeys seemed to display a decided lack of the intelligence which characterized their other actions. Thousands used to be taken in pens built so as to allow the birds to squeeze under the bottom logs or planks with little trouble to get at the corn scattered inside.

What sport was there in baiting a trench with corn and lying concealed in a screening shelter until half a dozen or more birds had their heads in line along the trench and a single discharge resulting in the death of all of them? We may well rejoice that such methods are in vogue no longer. But even so, the turkey is waging a losing fight.

It may be that a movement for a closed season on the wild turkey would result in a decided protest from the sportsmen, but can the turkey survive without it? A closed season restored the wood duck to the swamps and rice fields; surely the turkey is no less important. With a guarantee of adequate forest cover, a closed season would be of inestimable benefit to the species. It undoubtedly would save the turkey for future generations.

The wild turkey is essentially an American bird, it belongs to the New World and its very bronzed plumage is suggestive of the aboriginal Americans. The disappearance will take away from the woods one of their grandest inhabitants. No one can see a strutting gobbler without admiring the magnificent display of natural splendor. It is vastly different from the exotic beauty of that other strutter, the peacock. The latter is typical of Oriental fragility, witching grace and seductive extravagance of color. The turkey stands for solidarity, it embodies a splendid robustness which is strengthened by the setting of massive, moss-draped live oaks rather than the airy exquisiteness of an azalea bush which might reflect the peacock's plumes. The turkey is a natural asset of this country.

It is but to be expected that the Indians admired and valued the wild turkey. It meant much to them in flesh and feathers and intrenched itself in their legends and folklore to a considerable extent. We are indebted to the Cherokees for the information as to how the turkey got its distinctive beard. This story is embodied in an amusing myth which states that the turkey doubted the outcome of the race between the rabbit and the terrapin and refused to believe that the latter was the winner. Not only refused to believe it but set out to prove it a fallacy. One day the turkey encountered the terrapin returning from a foray with an enemy scalp, having this trophy about its neck, dragging on the ground. The turkey ridiculed the appearance of the terrapin, offering to show him how the scalp should be worn, saying that the terrapin's neck was too short and low to show the trophy to advantage. The terrapin agreed to let him try and handed over the scalp which the turkey hung about his neck, where it dangled handsomely against his breast. Taking a few steps aside, the turkey turned about slowly to allow the terrapin a good view, then walked away. The terrapin, becoming alarmed for the safety of its trophy, called for the return of it but the turkey only laughed and started to run. The outraged owner of the scalp then drew its bow, using cane splints for arrows, and attempted to cripple the turkey by shooting them into his legs. This accounts for the many small bones which are in the turkey's legs and which are of no use to him. However, the bird escaped with the scalp and has worn it to this day.

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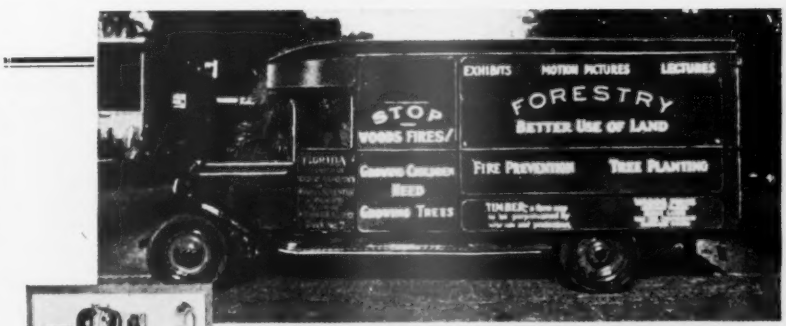

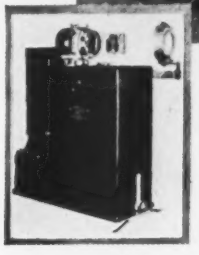

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The future of the wild turkey rests with this generation. The past two periods of this division of time have seen the passing of the once innumerable passenger pigeons, of the litte known Labrador duck and this country's only parrot. Other feathered citizens have been brought to the brink of oblivion—the whooping crane, the Eskimo curlew and the ivory-billed woodpecker. In much of its former range the turkey has already disappeared. What a calamity it would be if we were to witness the last of the wild turkeys as we are watching the end of the heath hen on Marthas Vineyard, for there is but one of these birds in existence now. The fight to save them has been long and faithful but it was begun too late. If the turkey is to be saved we must act at once.

Sky Maps

(*Continued from page* 699)

the required altitude it was easy to determine that the exposure of two rolls of film, all that we had, and return to the base would require about five hours of flying. The plane had a cruising range of about five and one-half hours, an ample margin of safety.

With complete data in hand an area of sixty-four square miles of mountain forest, nearly half of it recently burned over, was laid off on the best available map. An initial point, the prominent intersection of two surveyed roads, was selected and flight lines for the job laid down on the map. The first strip of pictures was to start over the initial point. It was determined that an offset of thirty seconds of flying time from the initial point would place the plane over the starting point of the second strip and an additional thirty seconds would place it in position for the third strip and so on. Strips of pictures are preferably taken flying north to give the best lighting, the plane returning to the south end of the area to start each strip.

Every detail was in readiness. Finally, a rare September morn, rising barometer, gentle breeze, marvelously clear air. The long, never-stretching climb behind the roaring motor up into the exhilaration of thin air. A tense, chilly period for the pilot. Photo-map flying calls for the highest degree of skill and concentration on his part. He must hold altitude even by barometric altimeter, time offsets by stop watch, fly true courses by landmark foresights, watch warily. A busy three hours, too, for the photographer, leveling and tripping the camera every fifteen seconds by the watch throughout the strip flights, keeping notes on time, exposure numbers, and strips during the return period.

Four hours and fifty minutes after leaving, the plane glided in with pictures of sixty-four square miles of rough Idaho jungle in detail that it would have taken a ground crew weeks of arduous toil to collect. Much of the detail on those pictures a ground crew could not have collected. Perhaps some of that detail is useless at present.

Photo-mapping film is developed and prints are made from it in much the same manner as from hand camera film. Any number of prints may be made and they may be used in any or all of several ways. Individual prints can be carried to the field, their position determined from recognizable landmarks and use made of them in timber-cutting, road-making, grazing administration or other forest work. Or, the prints may be compiled by fitting them together into a mosaic or composite picture of the entire area or of any portion of it.

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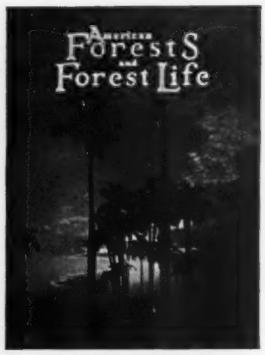

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Date.....

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I hereby apply for membership in The American Forestry Association and enclose $.....

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☐ Subscribing membership, per year, including Magazine	$4.00
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November, 1930.

existing conditions is to compile from them a good line map of the kind generally familiar to most forest users. The pictures show in great detail roads, buildings, clearings, drainage, streams, lakes and swamps, and general character and density of vegetative cover. Placed two in series, under a simple and cheaply constructed stereoscope they can be made to show relief perhaps more completely and faithfully than the best relief map shows it. So distinctly is relief brought out under the stereoscope that the figure of a tree photographed from two miles above appears to stand up distinctly a quarter to a half inch above the surface of the paper and to cast a shadow.

In no case can aerial photography in its present stage of development deliver a good, consistent map without the aid of a moderate amount of ground survey to tie in the pictures to cadastral or other surveys and to help in the elimination of distortions in the pictures due to tilt of the camera or differences in ground elevation.

The compilation of good mosaics and maps from photo-mapping pictures is by no means as simple or as easy as one might imagine. There is not space or time here to consider its technic. Sufficient to say that it is a task which calls for special equipment and for all the skill, ingenuity and patience of a master topographer and draftsman. There is good reason to believe that even these problems are surmountable and that it will prove practicable to make an excellent forest map directly from pictures with a minimum of ground work to establish a definite relationship between the ground and the pictures.

With airplanes steadily becoming safer and better, with flying certain to become cheaper and more common, with improvement in cameras and further development of photo-map-making technic, the forester, the forest user, the surveyor, the geologist, the drainage engineer, and a host of others of the builders and users of vast outdoor America can ill afford to neglect the possibilities of this most promising development in map-making methods.

The Quiet Season for Lumbermen

(*Continued from page* 717)

burned the attackers move on to the next one and in the course of time they succeed in destroying several millions of Denny's immediate household. The trouble is that while they are doing this some aunt or second cousin has set up a colony a mile or two away from the scene of the massacre and by the time the government scouts can get to the place another brood of beetles takes to the air. The government men wearily put on their packs and take up the chase, but it gets discouraging after awhile.

Denny's wife will lay about eight hundred eggs twice a year. The old folks, upon alighting in a new tree, bore through the

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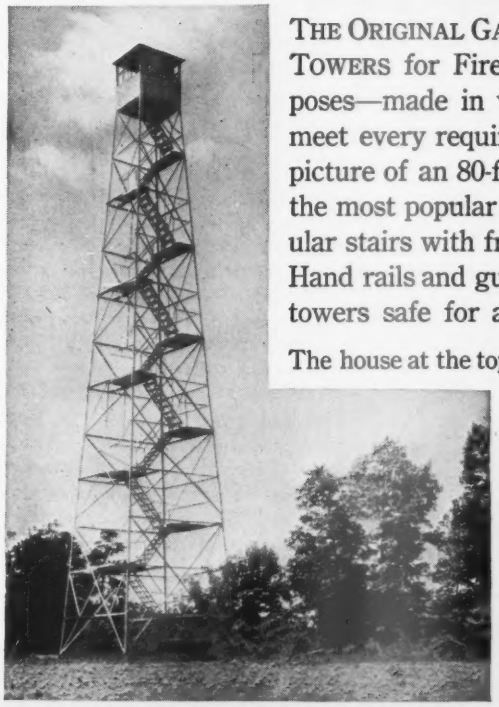
FIRE TOWERS



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bark and lay the eggs, which quickly hatch into grubs. These grubs dig canals between the bark and the tree, entirely girdling it and stopping the circulation of sap. A tree so girdled will wither and die in less than a month, so you can readily see that when a number of trees are affected it keeps a salvage crew on the jump trying to save the timber.

Denny's little comrades never pick a strong healthy tree in which to locate their claims. We've never heard whether Denny has a brain or not, but he knows enough to avoid such trees. The reason is that if he did his entire family would be wiped out shortly after they had moved into the place, owing to the amount of pitch that would collect in the canals dug by the larvæ. It is necessary to Denny's existence that the tree be killed at once and that it be a weakened tree in which no pitch will collect. This shows a certain amount of something or other on the part of the beetle—wisdom, intuition or just bonehead luck, we don't know which.

Anyway, that's the way the battle stands to date. Hordes of little Dennys buzz about the forest twice a year and lay eggs all over the place, while scientists, entomologists and a number of very profane lumbermen chase them into their lairs and burn the homes, torture the inmates, and kill the women and children. We look for the government to issue another bulletin on the subject any minute now.

Green Named Walnut Executive

Burdett Green, of Chicago, who for two years has been on the staff of the American Walnut Manufacturers' Association as director of its trade extension activities, took over the duties of secretary-manager of the organization October 1, succeeding George N. Lamb, who resigned to become general sales manager of the Flexwood Company, of which he also is a director. Mr. Lamb had been associated with the walnut organization since its inception during the World War, and when the return of peace found the walnut industry with great production possibilities but with canceled Government contracts and few markets, necessitating a stronger organization, he was the first full-time executive secretary.

The new secretary is a young man of wide and varied experience in wood research and market promotion. A graduate of the University of Missouri School of Forestry, he also has a master's degree from Yale University, where he specialized in lumbering, wood technology and the utilization of forest products. After completing his college training he joined the staff of the United States Forest Service and for several years on the west coast he worked with lumber producers on seasoning surveys, cost analyses, mill scale studies, and similar projects.

WHO'S WHO

Among the Authors in This Issue

William Mauthe

ALEXANDER SPRUNT, JR., is Curator of Ornithology at the Charleston, South Carolina, Museum and has been contributing for many years to magazines.

WILLIAM MAUTHE is Chairman of the Wisconsin Conservation Commission, and one of the leading foresters in the Lake States.

CLAUDE E. JOHNSON writes that he was born in the heart of the Missouri Ozarks, and that after attending the Southwest Teachers' College be began his career as a teacher.

D. S. Olson

D. S. OLSON is chief of planting in the Northwestern region of the Forest Service. Engaged in seed collection and nursery work, he writes that a mile of trail holds more of interest than Main Street.

HOWARD R. FLINT is a forest inspector, United States Forest Service, stationed at Missoula, Montana. For the past three years he has directed the airplane work in that region.

ARCHIBALD RUTLEDGE, well known writer and conservationist, has followed the woods and waters most of his life. Born on a plantation in South Carolina, he now makes his home near Mercersburg, Pennsylvania.

Paul Hosmer

PAUL HOSMER writes from Bend, Oregon, that "I've spent the last ten years writing stories about lumbermen. Before that I put in another ten years on newspapers." In addition to his writings, he confesses to being the best all round banjo player on the Pacific coast.

OVID BUTLER is Editor of AMERICAN FORESTS AND FOREST LIFE; EDWARD P. ANCONA is with the Forest Service at Albuquerque, New Mexico; PETER UPTON MUIR writes from Pittsburgh; WILLIAM ALPHONSO MURRILL is a well known lecturer and writer; CHARLES NEWTON ELLIOTT is associated with the Georgia Forest Service; K. S. TROWBRIDGE is connected with the School of Forestry, Georgia.

Yale School of Forestry

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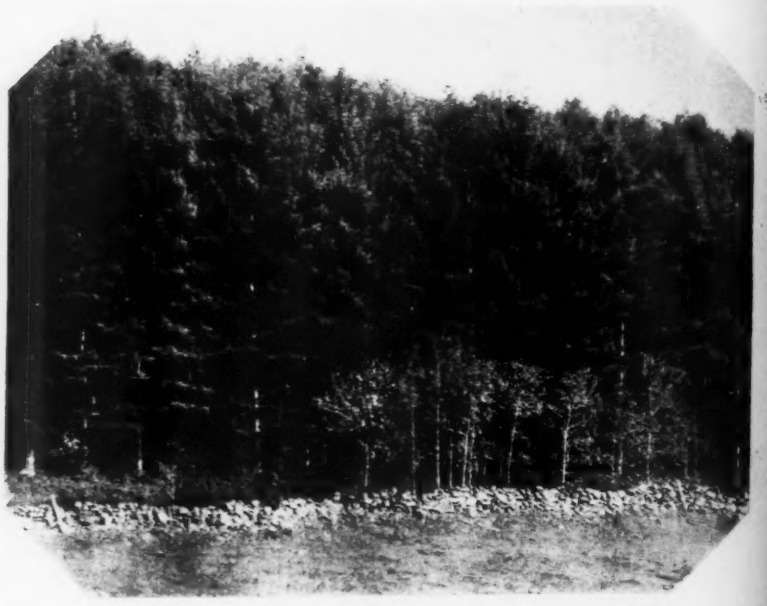
FRANCIS G. MILLER, *Dean*

Integration of Wood-Using Industries Means Closer Utilization, Increased Operating Profits, and Greater Incentive to Commercial Reforestation



A man-grown forest is most profitable when it can be closely utilized

IN ordinary lumber manufacture only forty per cent of the standing tree can be profitably utilized in the finished products. Over one-fourth of the tree is left in the woods in stumps, tops and limbs, and in defective logs. For the rest, consisting chiefly of slabs, edgings, trimmings, sawdust, and shavings, there is today for the most part an inferior utilization, often only as fuel.

For every 1,000 board feet of finished lumber nearly two cords of unused wood are available as raw material for some other wood-using industry. In this situation the wood industries have an opportunity, for additional sources of profit, possessed by few of their competitors. This material, now unutilized, may be converted to manifold uses through the processes of pulping and in chemical extractives and derivatives.

Progress of recent years in the integration of pulp and paper and other wood-using industries with lumber production, using for the raw material of the associated industries the by-products of logging and the sawmills, has been marked.

The time is not far distant when in many regions the wood industries will be dependent for raw material upon regrown timber, largely raised by the practice of forestry. Commercial forestry will rarely be profitable when only the saw-timber portion or 40 per cent of the total crop is capable of profitable utilization. When a much larger proportion of the total volume of the crop becomes commercially usable raw material, through the integration of forest industries and the development of diversified processes in wood pulping and in the chemical conversion of cellulose, the prospect for commercial forestry is much brighter.

Systematic and intensive research in all branches and phases of wood utilization, leading to complete integration of the forest industries and a full utilization of the forest crop, is the key to ultimate prosperity in the lumber industry and its perpetuation through commercial reforestation.

As an aid to progress in this direction the National Lumber Manufacturers Association has founded this year in Washington a Wood Products Research Laboratory.

Forestry Program of the National Lumber Manufacturers Association Summarized

1. Intensive campaign to encourage every commercial forest owner to study carefully the economic timber-growing possibilities of his properties.

2. Encouragement to forest owners to study the economic advantages of selective logging and sustained yield methods and to apply them wherever practicable.

3. Expert advice to individual forest-land owners and to regional lumber manufacturers' associations to stimulate and direct forest economic studies of individual forest-land properties.

4. Acceleration of cooperative activities under the Clarke-McNary and McSweeney-McNary Federal acts to eliminate methods of oppressive taxation, to extend effective protection against fires, to improve standards of wood utilization and to advance sound economic practice in forest conservation and replacement.

5. Development of plans for stabilization of the lumber industry and the orderly control of production.

6. Coordination of sales of Federal and State Forest timber with the activities of owners of adjacent private forest property.

7. Larger appropriations for the protection of National Forests.

8. Expansion of Federal, State and Municipal forest ownership.

9. Permanent reproductive administration of the Indian Reservation forests.

10. Education of the public to a more intelligent utilization of lumber and other forest products, and encouragement of public and private research in the utilization of logging and sawmill by-products and diversification of wood uses.

If you are interested in this trend of thought, send this coupon for a free copy of the address delivered by Dr. Wilson Compton before the Annual Meeting of the American Association for the Advancement of Science. It is called—"Will the Wood Industries of America Follow Beaten Paths or Blaze New Trails?"

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